Water Resources Survey

Part I:

HISTORY OF LAND AND WATER USE ON IRRIGATED AREAS

and

Part II:

MAPS SHOWING IRRIGATED AREAS IN COLORS DESIGNATING THE SOURCES OF SUPPLY

Silver Bow County, Montana

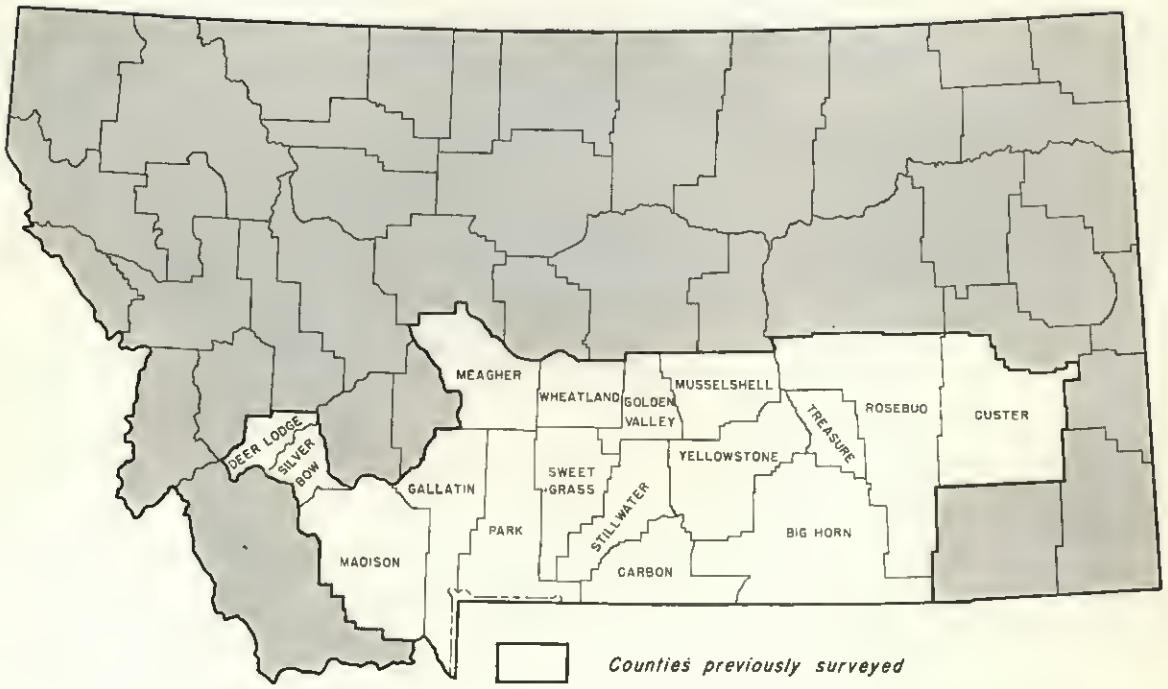
Published by
STATE ENGINEER'S OFFICE
Helena, Montana, June, 1955

WATER RESOURCES SURVEY

SILVER BOW COUNTY MONTANA

Part I

History of Land and Water Use on Irrigated Areas



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MONTANA STATE AGRICULTURAL EXPERIMENT STATION

O. W. Monson, Irrigation Engineer, and Consultant, Bozeman

June, 1955

Honorable J. Hugo Aronson
Governor of Montana
Capitol Building
Helena, Montana

Dear Governor Aronson:

Submitted herewith is a consolidated report on the Water Resources Survey of Silver Bow County, Montana.

This work is being carried on with funds made available to the State Engineer by the 33rd. Legislative Session, 1953, and in cooperation with the State Water Conservation Board and the Montana State Agricultural Experiment Station.

The report is divided into two parts. Part I consists of history of land and water use, irrigated lands, water rights, etc., and Part II contains the township maps in the county showing in color the lands irrigated from each source or canal system.

Work has been completed and reports are now available for the following counties: Yellowstone, Carbon, Stillwater, Big Horn, Custer, Rosebud, Musselshell, Golden Valley, Wheatland, Meagher, Sweet Grass, Park, Treasure, Gallatin, Madison, Deer Lodge, and Silver Bow.

The office files contain minute descriptions and details of each individual water right, water and land use, etc., which are too voluminous to be included herein. These office files are available for inspection to those who are interested.

The historical data on water rights contained in this report can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up to date.

Respectfully submitted,

FRED E. BUCK, State Engineer

ACKNOWLEDGMENTS

A survey and study of water resources involves many phases of both field and office work in order to gather the necessary data to make the information complete and comprehensive. Appreciation of the splendid cooperation of various agencies and individuals who gave their time and assistance in aiding us in gathering the data for the preparation of this report is hereby acknowledged.

Silver Bow County Officials

Frank Gorsh, Commissioner — Gene Daly, Commissioner
Willis Gerry, Commissioner
Frank Gabse, Clerk of District Court
William T. Duckham, Clerk and Recorder
George D. McCarthy, Surveyor — Joseph Lester, Assessor

History and Organization—"Inventory of the County Archives of Montana"
R. A. Dightman—"Climate"....State Climatologist
W. Clinton Bourne—"Soils"....Research Associate, Agricultural Experiment Station
Howard Connell—"Crops and Livestock"....County Agent
Frank Stermitz—"Stream Gaging Stations"....U. S. Geological Survey
U. M. Sahinen—"Mining"....Chief of Information and Service, Montana School of Mines
L. Osburnsen—"Soil Conservation Districts"....Area Conservationist, Butte
C. M. Hofferber—"Deer Lodge National Forest"....District Forest Ranger, Butte

The State Engineer's Office, Water Resources Survey, hereby expresses sincere appreciation to the many ranchers, farmers, and stockmen who have given their helpful cooperation in this survey.

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FOREWORD

In nearly all of the Western Reclamation States a water right is obtained by first making a filing with some legally designated central state agency—usually the State Engineer's Office—setting forth the amount of water desired and the area proposed to be irrigated. A study is made of the sufficiency of the water supply, and, if found adequate, a permit for the use of the water is issued and recorded. If studies show that the stream is depleted, the application is denied. The procedure in Montana, however, is vastly different.

In Montana the right to the use of water from a stream not adjudicated by the courts may be acquired in one of two ways. First, by posting a notice on the stream and filing a copy of same in the office of the County Clerk of the county wherein the appropriation is located and then proceeding to divert and use the water. Secondly, a person may divert and use water from a stream without posting or filing notice in which case a water right based thereon has been recognized as valid by the courts. Whenever it becomes necessary to adjudicate the stream both methods of acquiring rights have been recognized by the courts and the amount of water finally decreed and dates of priority in either case are determined by the evidences and proofs.

Under Montana law there is no restriction as to the amount of water one may designate in his notice of appropriation. As a consequence, the amount set forth in the filing in no way indicates the amount being diverted and used or does it show whether the water was ever used at all to perfect the right. Furthermore, there is no relationship whatsoever between the amount of water filed on and the normal flow of the stream. To further complicate this matter there is no law of abandonment in Montana. Action must be brought in court to abandon a right, which makes it almost impossible to prove abandonment if the defendant wishes to oppose the action.

There is no central office in the State where recordings are filed, or any supervision over the distribution of water from unadjudicated streams. The distribution of water from adjudicated streams is supervised entirely by the District Court that handed down the decree. One wishing to study the validity of a water right on a stream not adjudicated must make a search of the county records wherein the stream is located in perhaps two, three, or more counties if the stream courses through them. About the only result one will accomplish by such a research will be a tabulation of the dates of filing. The amounts of water filed on will be of no consequence since there is no conclusive evidence that the recorded appropriations have been perfected, or is there any documentary evidence of the rights which are being used but never recorded. Therefore, a purchaser of ranch property, where he has to depend upon irrigation from a stream that is not adjudicated, has no way of determining the validity or priority of his water right. He has no assurance of the value of the right until the stream is adjudicated by the court, when each claimant must prove his claim by material witnesses.

The pioneers who are able to offer direct testimony in adjudication suits are rapidly passing. One phase of this Water Resources Survey is to obtain all of the first-hand information possible on water and land use from the "old-timers" who are left, before it is too late. These data will include every known water right up to the time of completing the work in the respective counties and the information is on file for inspection in the State Engineer's Office. At the time of this publication, work has been completed and reports are available for the following

counties: Yellowstone, Carbon, Stillwater, Big Horn, Custer, Rosebud, Musselshell, Golden Valley, Wheatland, Meagher, Sweet Grass, Park, Treasure, Gallatin, Madison, Deer Lodge, and Silver Bow. A person having interest in lands located in any of the above-named counties may obtain a good idea of the sufficiency and priority of the water rights appurtenant to the land in question after studying the records in the State Engineer's Office.

In this and succeeding volumes of the data compiled by this Water Resources Survey, it is the intention to provide as much information as is possible relative to the water right records of the various counties, as well as to assemble such other information as may be available from all sources having knowledge of these various water rights. The location of the county where water right filings were first recorded presents a very difficult problem in compiling accurate verified water right information. In 1865, when Montana was still a territory, the area contained nine (9) original counties and by the time Montana became a state in 1889, the total of counties was increased to sixteen (16). During the period 1889 to 1895 this total changed to twenty-three (23); from 1895 to 1935 the total became thirty-five (35); and from 1935 to 1942 the number of counties created in Montana reached its present maximum of fifty-six (56). Throughout this evolution of counties there are many active recorded water right filings which have not been transcribed to the records of the county where they apply and are used today. Sometimes it is necessary to search the records of the original county, or subsequent county, in order to find water rights that have never been transcribed into the records of the present county. Every precaution is being taken to correct errors in the compilation of these data.

The results of this work, in the counties affected, proved to be very valuable and necessary in negotiating the Yellowstone River Compact between the states of Wyoming, North Dakota, and Montana. In arriving at an equitable division of the waters between the states, it was necessary for Montana to have a catalog of its irrigated land and water use. In the dispute with Canada over the use of water from Sage Creek, an international stream, the water resource survey played a very valuable part in justifying our uses for irrigation. This same question will undoubtedly arise in other river basins. It is highly important that Montana gather such data, and thereby be able to defend its water rights in the development of the great river basins of the Missouri and Columbia rivers and the international streams between Canada and Montana.

The subject of water rights is coming more and more into prominence as the rapid expansion of our irrigated area proceeds under the impetus of both State and Federal development programs. As new canals are dug and old canals and ditches are enlarged and extended, the relative area of land to be irrigated, compared to the water supply available for irrigation, becomes greater, and a competition for the limited water supply results, which often develops into controversy over the right of use of the water.

In a strict sense a water right does not imply ownership of the water in the same way as does a deed to a tract of land or a certificate of title to an automobile. A water right implies only the right to divert and use the water. Water when stored in a reservoir, however, is recognized as real property which may be sold or disposed of as desired by the owner. The ownership of the water of our rivers and streams rests in the State and the rules under which the State grants to the individual the right to use these waters are known as Water Right Laws.

The early settlers in Montana took up land under the provisions of the Homestead Law of 1862 and the Desert Land Act of 1877. The former Act gave 160 acres of land to anyone who settled on it and put it into cultivation. The latter deeded 640 acres of land to anyone who would irrigate it and pay the government $1.25 per acre. In 1890, filings under the Desert Land

Act were reduced to 320 acres. The construction of ditches on desert claims was in compliance for title to land rather than for irrigation, and little attention was paid to the water supply available. Consequently, miles of ditches were dug in Montana through which little or no water ever flowed. This is especially true in the drier parts of the state, where the diversions were made from intermittent streams.

In the more fertile mountain valleys irrigation was given more importance than in the plains country. Live streams provided a dependable source of water supply and the ditches which tapped them were designed to actually carry water, not merely to comply with a legal requirement to obtain title to a piece of land. Thus, the right to diversion and use of water for irrigation became as important as the acquisition of title to the land.

But, while the government granted a patent as evidence of title to the land upon proof of compliance with the Homestead Laws, there was no deed, certificate of title, or other legal instrument offered as evidence of title to a water right.

Water rights refer also to uses other than those for irrigation. Thus, the perfected right to the use of water for mining, power, fish hatcheries, bird refuges, recreational purposes, municipal needs, culinary supply and sewage disposal, manufacturing or navigation—all may become valid water rights.

The first irrigators took for granted their right to use water from creeks or rivers for irrigation. They saw water going to waste and appropriated it to their needs. It was as free to them as the air they breathed. They made no official record of the game they shot for food or the fish they caught in the streams and likewise considered it unnecessary to make official record of the time, place, or the amount of water diverted for irrigation. However, time has changed these conditions and it is now necessary to record the game killed and limit the fish catch in order to perpetuate game, and stock the streams. Likewise, it is becoming more and more necessary to file a claim for water appropriated from the streams and rivers for irrigation or other uses in order to protect the rights.

When game was plentiful, no one concerned himself with the number of deer a person killed, but when game became scarce, steps were taken to prevent a few persons from taking more than their share while others had to go without. To do this it became necessary to issue licenses or permits to kill game and also to keep a record of game killed—a practice which is still followed.

Likewise, when only a few settlers diverted water for irrigation and the supply was more than enough for all, no one was concerned about the exact amount used by any one person. But as more and more settlers constructed diversion dams and ditches and tapped the rivers and streams for irrigation water, it soon became evident that there would not be enough water for all. Thus, a year with low water brought disputes over the division of the supply. The older settlers, in such cases, demanded that the later comers close down their headgates and refrain from taking water, in order that the prior appropriations might have a full supply. The later users, on the other hand, insisted that the available supply be divided among all users so that all might share alike.

Thus, progressive over-development of irrigation, together with the occurence of seasons of water shortages, combined to bring about the enactment of Water Right Laws in the Western States where irrigation is practiced.

METHOD OF SURVEY

Data incorporated in these reports were obtained by the office and field survey methods in cooperation with the irrigators on the lands.

Ownership plats are made up from the Courthouse records, after which field forms are prepared for each owner as they appear on the plats, showing the name of the owner, aerial photograph number and farm boundary. The appropriated and decreed water rights that fall within the ownership boundary are also platted on this field form. These water rights are then checked with the ownership and deeds in the Courthouse records to determine, if possible, the name of the present day water user. All the water right information is listed on the field form and later verified by the water user in a farm-by-farm survey.

For all irrigation systems water users are asked for specific information as to the source of water, present acreage irrigated, potentially irrigable acreage under existing works, seeped acreage, condition of irrigation system, type of system, and water supply.

The irrigated land classification practiced by this survey includes the following: All land normally irrigated within a two or three year period directly from an existing gravity ditch system; irrigated above a ditch by a sprinkler system; sub-irrigated due to ditch locations; or irrigated by pumping from streams, reservoirs, wells, sloughs, and sumps.

Potentially irrigable land classified by the survey is limited to those lands lying under existing ditches that have feasible qualifications necessary to become irrigated land. These qualifications include: water supply; seeped areas; land under ditches in need of repair; and abandoned ditches.

The information in regard to the location of the irrigation system, presently irrigated and potentially irrigable lands under existing works, is indicated on aerial photographs, with the exact location of each shown, and distinguished by color.

The data obtained by the field survey are mapped on township maps from the aerial photographs by means of projection. In addition to the information pertaining to irrigation, all culture, drainage, sections lines, etc., is mapped in order to show accurate township plats for the area concerned. This information is then mapped by farm units on individual farm forms that show the farm boundary, the location and type of irrigation system, location of irrigated and potentially irrigable lands under the system, type of system and source of water. After these farm unit forms are completed, a summary is made of each township, which shows the name of the water user, section, township and range, source of water, whether a user has a private irrigation system or is under a ditch company or irrigation district, acreage irrigated from each source, present irrigated acreage, potentially irrigable acreage under existing facilities, and maximum irrigable acreage. The summary in these reports is then tabulated from the township summaries to show the totals for the county.

After this is accomplished and a final check made, color separation maps are drawn which include from three to ten separation plates, depending upon the number of irrigation systems that appear in color on the final township map in Part II of the reports.

Section and township corner locations are obtained by the photogrammetric system, based on Government Land Office maps, county maps, plane table sheets and other sources.

So far as known this is the first survey of its kind ever to be ventured in the United States. The value of the work completed is well substantiated by giving Montana its first accurate and verified information concerning its water use and resources under existing irrigation facilities. New development of land for irrigation purposes, by State and Federal construction agencies, is not within the scope of this report. No effort is made to analyze economic possibilities, or the problems of the irrigation projects, or to make recommendations as to future development. The facts presented are as found at the time of completing each report and provide the items and figures from which a detailed analysis of water and land use can be made.

The historical data contained in these reports can never become obsolete. If new information is added from time to time as new developments occur, the records can always be kept current and up to date.

HISTORY AND ORGANIZATION

Silver Bow County is located in the Southwestern part of Montana on the crest of the Rocky Mountains where the Continental Divide changes its trend toward the southeast and turns abruptly west and north. The whole area is mountainous with very little land suitable for cultivation. The Pipestone and Homestake Passes make this region accessible from the east; the valley of Silver Bow Creek, the ultimate source of Clark Fork of the Columbia, forms the outlet from the west. The Flathead and other mountain Indians once used the passes in crossing the mountains to get their supply of bison meat. Jim Bridger, Henry Dripps, Henry Vanderburg, and others of the American Fur Company and Rocky Mountain Fur Company; and Alexander Ross, Peter Skene Ogden, and John Work of the Hudson Bay Company crossed here in search of beaver. The usual routes of the fur traders, however, were north and south of this high country.

There is scarcely a trace of the visits of white men in this area before mining became the great industry of the northern Rocky Mountains. Historical records reveal the story that Caleb E. Irvine with a pack train of salt came through one of the passes about 1856 seeking to exchange salt for furs which the Indians might have. He reported later that he saw beautiful stained copper ore which the Indians had dug out with elk horns.

The area which became Silver Bow County was originally included within the Oregon Territory and when the Washington Territory was formed in 1853, the Clark Fork country was placed within its boundaries. The first legislature of Washington created Walla Walla County, extending eastward to the summit of the Rocky Mountains. In 1858, Spokane County was formed and included the present area of Silver Bow County. In 1860, the Washington Legislature formed Missoula County which extended from the 115th Meridian to the summit of the Rockies. When the Idaho Territory was created in 1863, all of present Montana was placed within its boundaries. The first legislature of Idaho established the new county of Deer Lodge which was carved from the eastern part of Missoula County with its western boundary the Meridian 113 degrees 30 minutes.

Montana Territory was created in 1864 from all that part of Idaho east of the Bitter Root and Cabinet Ranges. The first session of the Montana Territorial Legislature met at Bannack in December, 1864, and in January, 1865 passed a law recreating the counties established by Idaho and defining their boundaries. Deer Lodge County was to extend from 113 degrees 30 minutes to 112 degrees. The southern boundary followed the Jefferson and Big Hole Rivers and the parallel of 45 degrees 50 minutes.

Settlement within the area of present Silver Bow County began in January, 1864, when according to traditional account, "Bud Parker, P. Allison, and Joe and Jim Ester, on a prospecting trip", reached a creek near the present site of Butte and found evidences of gold in paying quantities. In this party, a discussion arose as to a name for the creek. A bend of the stream around the base of the hill formed the figure of "a gracefully curved Indian bow". When the sun came from behind clouds and struck the water "luminating them to brilliancy as they clasped the bale in a bow like silver", the name of Silver Bow was given the stream.

In May, 1864, G. O. Humphreys, William Allison, Denis Leary, and Alexander Scott found profitable diggings in the vicinity. In August, the first mining district was formed and miners came in rapidly. Mining camps grew into towns, and Silver Bow, Rocker, McMinnville, and Butte became important. In 1868, the whole valley along Silver Bow Creek from Silver

Bow camp to Butte was being mined. There were four or more men to every two hundred feet of mining claims. The mines yielded $200,000 worth of gold in 1868 and in 1869 they yielded $130,000.

Placer mining flourished for only a short time. By 1870, the gravel had been cleaned of its gold dust and nuggets and many placer miners had left the district. At the head of the creeks and gulches were masses of rock, which many believed, contained gold. To mine this rock, crush it, and wash it, required expensive equipment. There were some, however, who assumed the risk. Among the first quartz mines were the Parrott, Colusa, Mountain Chief, Original, Gray Eagle, Gambetta, Travona, and Alice. All of them produced gold, but silver soon became a more important product of the mines. The quartz outcropping was near Butte which soon became the headquarters for mining activities, while the placer mining district of Silver Bow, to the west, declined rapidly.

A few of the early prospectors were determined to risk their fortunes on Silver Bow Creek. Among these was Andrew Jackson Davis, who had been a prospector there in 1864. He stayed on after the placer mines were exhausted and turned to quartz mining. He obtained possession of the Lexington Mine, rich in both gold and silver. In 1881, Davis sold this mine and with the proceeds formed the First National Bank of Butte. He later acquired a number of mining claims and in 1887 sold them all to the Butte and Boston Mining Company which gave him the reputation of being the first millionaire of Butte.

William Owsley also came to Butte as a prospector in 1864 and remained to become wealthy from quartz mining operations.

William Farlin, too, did much to develop quartz mining around Butte. He had been there for some time and had seen a number of mines closed for the lack of capital, among them the Travona. Under Federal Law, mines on which the locators did less than ten dollars worth of work per hundred feet during the year, were open to filing by others. This law became effective on January 1, 1875, and on that day, Farlin filed on the Travona and other mines whose owners had lost their rights through failure to work them. This claim jumping continued around Butte as long as there were any closed mines and was the basis of many sharp tricks and many bitter feelings.

Merchantile and transportation facilities were a necessary adjunct of mining. Edward L. Bonner was one of the most important merchants of early Butte and western Montana. Associated with Daniel J. Welch, Bonner opened a store in Butte in 1874, which continued to be important for many years as the Bonner Merchantile Company. In 1879, Daniel J. Hennessy came to Butte in the employ of the Bonner Company. In 1886, he established the D. J. Hennessy and Company, which became one of the largest merchantile stores in Montana.

Quartz mining on a sound basis began soon after William A. Clark came to Butte in 1872. He had mined at Bannack and engaged in trading in Virginia City, Helena, and in Deer Lodge County. Having acquired a considerable fortune, he proceeded to buy the Colusa, Original, Mountain Chief, and Gambetta, which he considered to be the most promising mines. He then took a course in mining engineering at Columbia University which enabled him to direct his mining interests with unusual success.

It was apparent before 1875 that in the quartz mining around Butte, silver was more important than gold. Sluicing and the old stamp mills were ineffective with silver, and more expen-

sive methods of treating the quartz were necessary if the full value of the silver was to be obtained. In 1875, Clark and Farlin built a small stamp mill and prepared to treat ore from their mines. Within a year, Clark acquired control of this mill, and then built the Dexter Mill. In 1876, the Centennial Mill was also constructed. Clark succeeded in organizing the Colorado and Montana Smelting Company, which in 1879 built a large smelter south of Butte. He located the Moulton lode west of the old Alice Mine, and was negotiating for the Alice when Marcus Daly appeared in Butte and secured the Alice as his first purchase.

Daly became, with Clark, the most famous of the men who came to the Butte mines looking for investment opportunities. In 1876, Daly represented the mining firm of the Walker Brothers of Salt Lake City, and came to investigate the reports of rich silver-bearing quartz in the district. Daly decided at once that the Alice Mine was valuable and purchased it for the Walker Brothers. The mine had been closed for some time, but Daly opened it, and soon made it a great silver producer. The camp around the Alice Mine soon developed into a town and was named Walkerville.

Charles T. Meader came to Butte the same year Marcus Daly arrived and found a profitable investment in the East and West Colusa claims adjacent to one of Clark's mines. He developed these rapidly, and in 1881 built the Bell Smelter nearby. Soon a town grew up and was named Meaderville in his honor.

Lee Mantle, who later became United States Senator, came to Butte in 1877 and became interested in mining which soon made him wealthy. In 1881, he established "The Inter-Mountain", a Republican newspaper, and continued active in politics until about 1900.

By 1880, Butte as a center of a great silver mining region, had become a populous town, while the nearby towns of Walkerville, Meaderville, and Centerville housed many people. The inhabitants were mostly miners who found steady employment at good wages. Irish from the East, Cornishmen, Scotch, Welsh, and Scandinavians were coming in steadily, and there were also many former soldiers from the Civil War who came and sought a chance to make their fortunes here.

The growth in population and wealth in Butte and the nearby mining camps led to a demand for local government. On petition of the citizens of Butte and the area nearby, the legislature in 1881 separated this region from Deer Lodge County and set up Silver Bow County with Butte as the county seat. The first election was held April 4, 1881. The county thus formed is triangular in shape with its boundaries very irregular. On the north, it is separated from Deer Lodge County by the divide between Brown's Gulch and Dry Cottonwood Creek; on the east, from Jefferson County by the main ridge of the Rockies and Pipestone Creek; on the south, from Madison County by Fish Creek; from Beaverhead County by the Big Hole River; and on the west, from Deer Lodge County by the divide east of Willow Creek.

The beginning of copper production as a principal industry at Butte, has been attributed to Marcus Daly. According to the story, he observed that in the Alice Mine the ore below 200 feet had an increasing copper content. So much copper made it difficult to smelt the silver by the processes then used, and Daly saw in this fact a vision of a new industry.

There was a silver mine near Butte, owned by Michael A. Hickey, who had named it the Anaconda. Its production of the white metal had decreased and Hickey was anxious to sell. Daly examined it and saw in its ore vast quantities of copper. He recommended to the Walker

Brothers that the firm purchase the mine, but an expert sent from Salt Lake City reported adversely, and the firm refused to buy it. Daly was convinced, however, and in 1880 purchased the Anaconda for himself, for $30,000. After further explorations, Daly believed he had fallen upon a vast deposit of copper which underlay the whole region. He closed down the Anaconda and spread the report that it was worthless. He then purchased a number of mining properties adacent, and acquired much of what he considered a valuable part of Butte Hill. Within a year he was ready to start copper mining on a huge scale. By 1882, Daly's mines were producing vast quantities of ore bearing silver and copper, and Daly had become one of the most powerful men in Butte. Clark also was quick to grasp the possibilities of copper mining and plunged into the bidding for mines in the Butte district.

Daly felt that he could produce copper more cheaply by treating the ore near where it was mined and therefore decided to build a smelter near Butte. His first search was for an adequate supply of water, imperative for the operation of a smelter. He found Warm Springs Creek, some thirty miles west of Butte, satisfactory, and made the beginning of the present smelter and the city of Anaconda. After a sharp encounter with Clark over the control of the water, in which Daly was the victor, rapid progress was made enlarging the smelter facilities.

The fame of Butte as a copper producer led to continued heavy immigration. Clark imported many Cornishmen, "Cousin Jacks", they were called, because he liked them as miners, while Daly brought in many Irishmen.

Among the many capable business men, which copper mining brought to Butte, was Patrick A. Largey, who arrived in 1881. He purchased the Speculator Mine and became one of the leading operators in the territory. He built a telegraph line to connect Butte with Virginia City, and constructed the first electric light plant in the city.

The period of the eighties was prosperous for Butte and Silver Bow County. The continued drop in the price of silver was more than offset by the increase in the value of copper produced. Butte became a city of millionaires. Politics centered about mining, and the rivalry of Clark and Daly for control of the county and the territory became steadily more bitter. Clark took over a newspaper, "The Butte Miner", established in 1876, and by securing an able staff, gained for it prestige and wide circulation. Daly established "The Anaconda Standard" in 1889, and by lavish use of money gave it all the attractive qualities of a metropolitan newspaper. In the campaign of 1888, Clark was the Democratic candidate for delegate to Congress, opposed by Thomas H. Carter, an unknown young lawyer. Through the opposition of Daly, Clark was defeated and thenceforth the two men, both Democrats, were open and bitter enemies.

In 1889, the year that Montana became a State, F. Augustus Heinze came to Butte. He was a young man of attractive personality, shrewd, cultured, and trained in mining at the Columbia School of Mines. In Butte, he started working for the Boston and Montana Consolidated Copper and Silver Mining Company. He studied the veins, the interlocking of one with another, and soon acquired a superior knowledge of the minerals under the Butte hill. After this experience, Heinze engaged in mining on his own account. He leased the Glengarry, which was considered worthless, and extracted from it profits of half a million dollars. Then, in 1895, he bought the Rarus, and later leased the Estrella from James Murray and by a trick kept all the profits from this mine for himself.

For a time, Heinze operated without coming into contact with the great mining interests. As he became more powerful, questions were raised regarding his rights to the ore in his Rarus

Mine, which questions were based on the "apex" theory. Under the Federal laws of 1872, the ownership of underground minerals did not rest upon the ownership of the surface ground above. The owner of the ground where the veins "apexed", that is, where it came to the surface, owned all the vein, no matter under whose land it might be found. Heinze, under the law, claimed that much of the ore being mined by others "apexed" within the surface limits of his Rarus Mine, and therefore belonged to him. Since an expert could determine the course and slant of veins only by extensive study and excavation, no one knew absolutely just where the apex of a vein might be, and Heinze's contention was as likely to be right as that of his competitors. It was of particular value, therefore, to have a friendly judge. Heinze found in William Clancy, a Populist who had recently arrived from Missouri, a judge on whom he could depend. Clancy closed the mines of rival companies by injunction orders and even ordered one into receivership. In many cases having to do with the "apex theory", as in the Rarus and Minnie Healy, Clancy sustained the word of Heinze's experts in preference to that of his rivals.

Heinze had many friends in Butte and was active in community affairs. He built a smelter and reduced smelting costs greatly. He paid good wages to his workmen, by whom he was well liked, and found a further opportunity to build his power and prestige by capitalizing on the bitter feud between Clark and Daly.

In 1893, Daly had blocked Clark's election to the United States Senate, and for two years the seat remained vacant. In those days the U. S. Senator was elected by the legislature and not by popular vote. In the fight for the location of the capitol in 1894, Clark worked for Helena in order to prevent Daly's city, nearby Anaconda, from having the honor. In 1899, Clark tried once more for the United States Senate, and after a bitter and expensive fight in the legislature, during which many stories of wholesale bribery were openly told, Clark was declared elected. Daly did not stop with this defeat, but accused Clark before the United States Senate of obtaining his election by fraud and bribery. Clark resigned before the Senate Committee passed finally on the charges and was immediately appointed to succeed himself. Charges of fraudulent practices again prevented him from claiming the seat, until the legislature again elected him in 1901.

In the midst of the political feud, Heinze began his struggle with Daly's interests. Daly had united many of the mines at Butte and formed an alliance with the Standard Oil Company, out of which grew the Amalagamated Copper Company, formed in 1899. This new concern took over practically all the mines in Silver Bow County except those of Clark and Heinze. Heinze was the first to move. He claimed that a little bit of ground, which he named the "Copper Trust", furnished the apex for a number of amalgamated mines. To strengthen his position with the labor unions, he urged them to demand an eight-hour day, and also attacked the "Company Store". Clark joined Heinze in the fight, and in the campaign of 1900 the two united in the attack upon the Amalgamated Copper Company. They carried the State for Bryan, the Heinze ticket in Silver Bow County was elected, and the State Legislature was favorable to Clark's re-election to the Senate. Heinze continued to fight against the Amalgamated in a notorious lawsuit over the Minnie Healy Mine in which charges of bribery were freely made, but Clark decided after Daly's death to make peace with the great corporation. Heinze, thereafter, fought alone for a time, but the Amalgamated finally forced the legislature to pass a "Fair Trial Bill" that gave it a better chance in the courts. Heinze then sold all his mining interests in Butte to his opponents and left the State. Reorganization of the now all

powerful Amalgamated Copper Company to meet Federal anti-trust laws gave it the name of the Anaconda Copper Mining Company which has continued to be the most powerful company operating in the Butte region.

Butte, one of the world's greatest mining cities, is to all intents and purposes Silver Bow County. It takes its name from the huge isolated butte that stands sentinel-like on the western end of the town. Butte is one of the largest consuming markets in Montana and is a distributing point for a wide variety of farm and manufactured products.

The Montana State School of Mines is located in Butte and draws students from all parts of the United States as well as from foreign countries because of its proximity to the copper mines and mills.

"The Butte Miner", the first newspaper established in Silver Bow County, began circulation in 1876. It became a daily in 1879 and published telegraphic news from all parts of the world. In 1928, the paper was consolidated with "The Anaconda Standard" and the new edition, now published in Butte, was named "The Montana Standard". Another Butte paper, "The Butte Inter-Mountain" was established in 1881. Many prominent men were connected with it during its early years, but Lee Mantle finally became its principal owner. In 1913, it was sold to J. H. Durston of "The Anaconda Standard" and he renamed it "The Butte Post". This paper is now published only in the evening as "The Butte Daily Post". In recent years, "The Montana Labor News", published in Butte, has exerted strong influence throughout the state.

Mining, by far, is the most important industry in the county, with agriculture playing only a minor role. In 1935 there were only 192 farms in the county. Much of the timber growth was destroyed by crude ore roasting and smelting methods used in the earlier mining days, which left the landscape barren for miles around the city of Butte.

The altitude of Butte, the county seat, is 5,755 feet. Because of its elevation above sea level and the tremendous depth of some of its mines, the city has acquired the slogan of "A Mile High and A Mile Deep". The immense wealth that has been taken from the hill on which Butte lies has gained for it the name of the "Richest Hill on Earth".

Silver Bow County is the smallest county in Montana, having an area of only 716 square miles. Census figures in 1950 list the county with a population of 48,422, third largest in Montana, being surpassed by Yellowstone and Cascade counties respectively.

TRANSPORTATION

Butte, the county seat, is the railway center of the State. The county is served by two main transcontinental railroads, the Chicago, Milwaukee, St. Paul and Pacific, entering the county from Little Pipestone Canyon on the east; and the Northern Pacific, entering from Homestake on the east. From the west both railroads enter Silver Bow County near Gregson Hot Springs from the upper Deer Lodge Valley.

Branch lines of two other transcontinental railroads serve Butte. The Union Pacific (Utah Northern) enters at Melrose and terminates at Butte. The Great Northern enters just north of Butte at the head of Elk Park and terminates at Butte. From the railroad junction at Silver Bow to Butte, the Northern Pacific uses tracks belonging to the Union Pacific Railroad.

Marcus Daly's railroad, the Butte, Anaconda and Pacific, serves only the mining industry at Butte and the smelter at Anaconda.

Two main Federal highways, U. S. 10 South and U. S. 91, cross the county. U. S. 10 South enters from the east at Pipestone Pass on the Continental Divide and leaves near Gregson Hot Springs. From the north, U. S. 91 enters at the head of Elk Park and joins U. S. 10 South at Butte. Both highways are combined to Nissler Junction, where U. S. 91 continues south, leaving the county at Melrose.

State Highway No. 43 follows up the Big Hole River after leaving U. S. 91 at Divide and the county a few miles west of the Butte Water Company pumping plant. At the Dicky Bridge No. 43 re-enters the county again for a short distance to the county line east of Bear Creek. Almost all the county roads are graded and gravelled with a few exceptions.

The Intermountain Transportation Company and Greyhound Bus Lines, in addition to various freight truck lines, connects Butte with other points.

There are two major airline terminals in Butte, Western Airlines and Northwest Orient Airlines. Northwest has one flight a day east and west, while Western has one flight a day north with connections east, south, and west.

CLIMATE

The Continental Divide crosses Silver Bow County in a WNW-ESE direction 10 to 15 miles south of Butte, then forms the eastern boundary of the county. The elevation varies from around 5,500 feet in the valleys to more than 7,000 feet along the crest of the Divide. The north and west slopes of the Divide form part of the headwaters of the Clark Fork of the Columbia River, while that portion of the county on the south slope drains into the Big Hole-Jefferson-Missouri River system.

Due to the high elevation, the county is one of the coolest in Montana. At the Butte Airport the yearly normal temperature is 38.3°, 4.9° cooler than the State normal of 43.2°. There is much cloudy weather from winter through early summer; but late summer and early fall months are mostly clear, with warm days and quite cool nights which are characteristic of high elevation areas. Winters are cold, and when outbreaks of Polar air occur, there are extended periods when minimum temperatures may be zero or below. During these cold spells air movement is generally light and because of cold air drainage, temperatures at valley locations usually are much colder than at places several hundred feet higher. Frequently, when severe storms move southward over the state, the Rocky Mountain Range will deflect them eastward, and under such conditions temperatures may be much warmer than just a few miles north and east of the Divide. Invasions of air masses from the Pacific Ocean often bring heavy snow or rain on the west side of the mountains, but under these conditions precipitation is usually much lighter on the eastern slopes.

Showers or rain are frequent during the spring and early summer months. Sixty-nine percent of the year's precipitation falls during the growing season, April through September. Maximum rainfall occurs during June when more than two inches usually can be expected, and the minimum falls in February when the average is only slightly more than one-half inch. There is considerable winter accumulation of snow at high elevations which melts in the spring and supplies ample water to the mountain streams. Run-off decreases rapidly in general after the snow melt season ends. Thunderstorms are frequent during the summer, and at times they may be severe with numerous lightning strikes. Damaging winds occasionally accompany these thunderstorms.

During the 30 years 1921-1950 at Butte, the average period from the last day of minimum temperature of 28° or below in the spring, to the first minimum of 28° or below in the fall, was 121 days. During the 30-year period the latest date on which such a low temperature occurred was June 30, and the earliest in the fall was August 29.

Weather records have been kept at various locations in Butte since 1894. At present, the official observation station is at the Municipal Airport where observations began July 14, 1931. A second station, for comparative purposes, was established on the School of Mines campus in January, 1946, but the period of record is too short to compute reliable averages. However, indications are that precipitation is lighter and temperatures are warmer at the School of Mines than at the airport. Since 1894, the warmest temperature recorded in Butte was 100°, and the coldest -52°. The wettest year was 1909 when 20.55 inches of precipitation were measured; the driest year was 1935 with only 6.38 inches.

SOILS

Lying as it does across the Continental Divide, Silver Bow County is predominantly mountainous. It includes rounded strongly weathered granitic ranges, such as Pipestone Pass, bold rocky prominences as in the south part of the county, subdued ridges and slopes, and all topographic forms between. A series of small interconnected basins and valleys, with gently sloping to hilly topography, cross from north to south in the central part. A few disconnected small basins are scattered through other parts of the county. The underlying rocks which have weathered to form the soils include granites, andasites, quartzites, sandstones, shales, limestones and valley-filling materials varying from clays to gravels. Climatic conditions range from arid to sub-humid. The native vegetation includes both grassland and forest associations.

Since the character of soils is determined by climate, vegetation, topography, parent materials (geologic formation), and other factors of the environment, a large number of different soil types exist in Silver Bow County.

The soils on the benches and fans of the valley are chiefly Browns with grayish-brown surface soils, brown upper subsoils with blocky or prismatic structure, and light gray, highly calcareous lower subsoils beginning at 8-12 inches. Textures vary from light sandy loams to clays. Natural fertility, permeability, moisture holding capacity, and other characteristics affecting use and management range widely. In many places, local spots of claypan soils ("slick spots") are common. The associated soils of the flood-plains are also of varying quality. They are mostly imperfectly to poorly drained, and in some cases, saline or strongly acid. Principal land uses are hay and pasture production.

The mountainous parts of the county include both grassland and forest soil areas. The grassland soils range from Browns at the lower elevations, where rainfall is limited, through Chestnuts (dark browns) to Chernozems (blacks) on the higher mountain slopes. These areas are used for grazing; their carrying capacity varying with rainfall and such soil characteristics as texture, structure, depth, and kind of parent material.

The soils of the forested areas belong chiefly to the Gray Wooded great soils group. They have light colored surface soils, and where best developed, the brown subsoils are more clayey than the surface soils. The principal land uses are production of timber products, grazing, and recreation.

CROPS AND LIVESTOCK

Silver Bow County, being the smallest county in the State, has a land area of 456,240 acres with 245,219 acres or 53.74% being Federal owned land. Of this Federal owned land, the Bureau of Land Management controlls 57,507 acres and the Forest Service 187,712 acres. The remaining 211,021 acres of land area in the county consists of 115,423 acres of farm land and the balance of 95,598 acres are taken up by highways, public utility land, state land, and incorporated towns and cities.

A general break-down of the agricultural land in the county is as follows: 11,725 acres are classed as crop land including wild hay; 102,231 acres as privately owned grazing land; and 1,467 acres taken up as farmsteads and farm road land.

There are 164 farm units in Silver Bow County with the largest containing 23,565 acres and ten or more units containing over 5,000 acres. The average size farm or ranch in the county is 871 acres.

Wild hay from mountain meadows is the chief crop harvested in the county with some alfalfa being grown in the Divide-Melrose area and near Gregson. Very little grain is produced and harvested as such. The area planted to wheat in the county is around 200 acres annually. Some barley is grown and harvested for feed and in many cases rye is planted on dry land and harvested for hay. Much of the irrigated meadow land is cut for hay and then used for late fall grazing purposes.

Much of Silver Bow County is range land. Although the Forest Service does an excellent job in range management, most of the privately owned land is badly overgrazed and invaded by sagebrush, weeds, and poisonous plants.

Beef production is the leading livestock enterprise in the county with dairy production ranking second. The latest census shows approximately 7,000 beef cattle and 1,100 dairy animals, with sheep and swine of much less importance. Poultry is raised on two-thirds of the farms although the numbers are small. A very low percentage of poultry or poultry products are sold off the farm.

The Madison-Jefferson Dairy Herd Improvement Association, of which several dairymen in the county are members, has done much to increase dairy production in the last 17 years. Most of the milk produced in the county, as well as the Whitehall and Elk Park area, is processed at once of the larger plants in Butte. Other small dairies pasteurize and sell their product on city milk routes. Competition is keen from other counties in the State and Idaho for the milk market in Butte.

While mining is the main industry, much of Silver Bow County's income is derived from agriculture. More land is being put under irrigation each year, and at present, studies are being made for the construction of a dam in the upper Brown's Gulch area which will furnish water for an additional 2,000 acres.

WATER SUPPLY

The Continental Divide separates the drainage area of Silver Bow County into two major river basins: The Columbia and the Missouri. Silver Bow Creek and its tributary, Blacktail Deer Creek, form the extreme upper reaches of the Columbia River Basin within the United

States. Streams flowing from the east slopes contribute some water to the Big Hole River. Irrigating water is in short supply due to the pollution of Silver Bow Creek from the mines. Apparently, the mining operations in and around Butte have dropped the water table to a sufficiently low level to dry up a number of springs and streams. This fact is evident from the large number of early date appropriations on springs and streams for land that was once productive but is now dry and out of use; the streams now being dry washes.

The Missouri River Basin

The Big Hole River, which forms the south-west boundary of the county, furnishes water for the City of Butte, and for irrigating land along its course. The only east slope tributary flowing into the Big Hole River out of Silver Bow County of importance to irrigation is Divide Creek. Camp Creek, another tributary of the Big Hole River, is the south-east boundary line of the county dividing Silver Bow and Madison counties. Fish Creek, a tributary to the Jefferson River, is a portion of the east boundary which divides Silver Bow and Jefferson counties. While both of the last named streams are decreed, they contribute little to the over-all irrigated acreage of the county.

The Columbia River Basin

That portion of Montana west of the Continental Divide drains into the Columbia River Basin through the Clark Fork and Kootenai Rivers. The Clark Fork River was named for Capt. William Clark of the famed Lewis and Clark expedition. Originally, the name "Clark Fork" probably applied to the river from its headwaters to its confluence with the Columbia River north of the International Boundary in British Columbia. However, the Clark Fork of the Columbia since that time has been given other names in different localities along its length by the people as the country was settled, and water filings have been made using these local names. In order that these filings correspond to the different segments of the river, it was known as follows: Headwater streams were considered to be Silver Bow Creek and German Gulch Creek, which combine near the railroad station of Durant in the western part of Silver Bow County, to form the Deer Lodge River. This designation existed to the confluence of the Little Blackfoot River with the Deer Lodge River near the town of Garrison in Powell County. Below this point and to the confluence with the Blackfoot River near the town of Bonner in Missoula County, it was known as the Hellgate River. From this point to the junction with the Flathead River near the town of Paradise in Sanders County, the stream was called the Missoula River. Between the mouth of the Flathead River and Lake Pend Oreille in Idaho it took the name Clark Fork River, and from Pend Oreille Lake to the Columbia River it was known as the Pend Oreille River.

The only important stream for irrigation purposes in the Columbia River Basin in Silver Bow County is Brown's Gulch Creek and its tributaries. Other streams in the basin are Blacktail Deer Creek, Sand Creek, and German Gulch Creek.

STREAM GAGING STATIONS

The United States Geological Survey carries on the work of measuring stream flows in cooperation with funds supplied by the State and several Federal agencies. The results are tabulated in book form, the last publication being in 1949. The water year, as published in the books, begins October 1 and ends September 30 of the following year.

Following are equivalents useful in converting from one unit of measurement to another:

(a) In Montana, one cubic foot per second equals 40 miner's inches.

(b) One acre foot is the amount of water required to cover an acre one foot deep.

(c) One cubic foot per second will nearly equal two acre feet (1.983) in 24 hours.

(d) A flow of 100 miner's inches will equal five acre feet in 24 hours.

(e) One miner's inch flowing continuously for 30 days will cover one acre 1½ feet deep.

Big Hole River

A gaging station is located at the bridge on U. S. Highway 91, ⅛ of a mile from Rock Creek, or 8 miles south of Melrose. Records are available at this station from March 15, 1924 to September 30, 1954, but the records are fragmentary from 1924 to 1932. The drainage area above the gage is 2,470 square miles. The maximum discharge observed over the 22 years of record was 23,000 cfs (June 14, 1927) when Wise River Reservoir Dam failed. The maximum discharge unaffected by the dam failure was 14,100 cfs (June 3, 1948) and the minimum was 49 cfs (August 17, 1931). The average discharge for the 22 years of record is 1,124 cfs. There are many diversions above the gage for irrigation of about 136,000 acres of land in the Big Hole Basin.

German Gulch

A gaging station was established on April 18, 1955, located 300 feet above its confluence with the Clark Fork River, or 6½ miles west of Ramsey.

MINING

Silver Bow County is the most important mining county of the State, and the Butte district in Silver Bow County is one of the important mining districts in the world. Other districts in the County are German Gulch (Siberia), Highland, Moose Creek, Basin Creek, Divide Creek, and Melrose.

The overwhelming importance of Silver Bow County as a mining county in Montana is well proven by the following statistics: From 1880 through 1953, Silver Bow County has produced (mainly from the Butte district) gold, silver, copper, lead, zinc, and manganese valued at $3,077,900,000 or 83% of the total value of these metals produced in the whole State of Montana since 1862. The County has produced to the end of 1953, 2,156,547 fine ounces of gold (12% of the State's total since 1862), 586,655,139 fine ounces of silver (74%), 13,928,930,000 pounds of copper (99%), 670,898,000 pounds of lead (40%), 4,014,474,000 pounds of zinc (86%), and about 90 per cent of the manganese ore produced in Montana. In the process of smelting and refining, the Butte ores have yielded considerable amounts of valuable mineral by-products such as arsenious oxide, sulphuric acid, and the rarer metals such as cadmium, germanium, indium, and platinum group metals. In the non-metallic field, Silver Bow County has produced appreciable quantities of phosphate rock, sand and gravel, stone and clay.

Butte District

The Butte district as herein described, includes the old organized mining districts of Summit Valley east of Missoula Gulch, the Independence district west of Missoula Gulch, the Lost Child district, four miles south of Butte on Yankee Doodle Gulch, and Brown's Gulch northwest of Butte. All of this area is tributary to the City of Butte, which is the principal supply point for the mining industry of south-western Montana, and is served by four transcontinental railroads.

Placer gold was first discovered on Silver Bow Creek (now called Clark Fork River) near Nissler Junction about 7 miles west of Butte in 1864, but placer mining was carried on up to what is now the main business district of Butte. However, the placers soon played out, and by 1867 there was very little activity in the area. In 1866, W. L. Farlin located the Travona (then called Asteroid), and from this mine smelted ore yielding an ounce bar of silver, the first in Montana. However, silver mining did not become active until 1875 when Farlin relocated the Travona and began active operations. Other silver mines were soon opened and Butte started on a silver mining era which reached its peak in 1892 when the price of silver began to decline. Copper mining began in a small way in the early 70's, but was not successful until 1882, which can be taken as the beginning of the copper-mining era that has continued up to the present time. Zinc mining began in 1905 and received great impetus during the first World War. Since 1948 the production of zinc has exceeded that of copper in quantity but not in value. Manganese mining started in 1916, and received a great impetus during World War II, when production was almost tripled. In 1953, Silver Bow County accounted for over 92% of the manganese ore produced in Montana and about 75% of the manganese ore produced in the entire United States.

Most of the country rock in the Butte area is quartz monzonite (Butte granite) of the Boulder batholith, a huge mass of granitic rock 20 to 25 miles wide extending from just south of Helena to 20 miles south of Butte. The "granite" is intruded by quartz porphyry in the main part of the Butte district and by aplite in the western part and eastern part. Intrusive and extrusive rhyolite also occur in the western part of the area. Southward, the granitic rocks are buried under the alluvrium and lake-bed material of the "Flat".

At least three systems of veins are recognized: The East-West (Anaconda, Syndicate, and Rainbow) system; the North-West (Blue Vein) system, and North-East system. The East-West system is the oldest. The veins strike east and dip steeply to the south. The system is the most intensely mineralized, and some veins have mineralized zones over 100 feet in width. The veins of the North-West system strike N. 40° to 60° W., and dip steeply to the southwest, cutting and offsetting veins of the East-West system. They are well mineralized. The North-East system is the youngest and includes all veins and faults younger than the North-West system, although they are not all of exactly the same age. The veins and faults cut and offset the veins of the two earlier systems. Some of the North-East veins have been mineralized to the extent that they are mined, but as a rule most are barren of commercial deposits. In the highly fractured zones of the central area, the country rock between closely spaced veins is itself sufficiently mineralized to constitute a low grade ore. This low grade ore is at present being mined by a block-caving method at the rate of about 15,000 tons per day. There is a definite zonal arrangement to the ore deposits. There is a central copper zone which is also the zone of most intense mineralization and wallrock alterations. Nearly surrounding this is the intermediate zone in which the principal metal is also copper, but zinc becomes more and more important away from the central zone, manganese also begins to appear in this zone. Beyond the intermediate zone is the peripheral zone in which copper is sparingly present, but in which zinc, lead, and manganese are important. Silver occurs in all zones. The zones are gradational one into the other.

Though a list of the principal mines in the Butte district would show names famous in the history of mining, at present the main part of the district could be considered one vast interconnected mine under one operation, but with many openings.

German Gulch (Siberia)

German Gulch is in the western part of Silver Bow County, about 18 miles west of Butte. The placers were discovered in 1864 and have been worked intermittently since that time. The total production of placers from this district to the end of 1930 is about $5,000,000. Early day miners discovered gold-bearing rock near the head of the gulch which they attempted to develop, but owing to the low grade of the deposits, no deep mines have as yet proved profitable, although there is apparently large quantities of the low grade material available.

Volcanic flows or intrusives occupy the lower end of German Gulch. Rhyolite extends up the gulch for about 2 miles above the three forks. At the head of German Gulch occur quartzites of probably Cambrian and Beltian age. Quartz monzonite, similar to that of the Boulder batholith, lies between the quartzites and rhyolite. The quartzites strike east and dip 70°-75° S.; are much broken by faults, and are intruded by some quartz diorite sills. Paleozoic limestones overlie the quartzites, but owing to the great thickness of the quartzites, several hundred feet, Winchell correlates part of them with rocks of the Belt series.

In addition to the placer deposits, which are still being worked, German Gulch has some extensive deposits of low-grade gold ore, which are at the head of the gulch in the Beltian quartzites. The 'ore' is said to be exposed for over 1,000 feet in length and breadth on the northwest side of the gulch, and an adit at creek level cutting across the strike of the quartzites for a distance of 780 feet and attaining a vertical depth of 400 feet, is said to be in 'ore' for 70 per cent of its length. The ore is said to average about $2.50 per ton in gold.

The gold occurs both native and as a telluride, and with it are associated pyrite, chalcopyrite, malachite, melanterite, gypsum, serpentine, talc or sericite, hematite, limonite, and quartz.

Highland, Moose Town, and Upper Basin Creek

These closely related districts are at the heads of Fish Creek, Moose Creek, and Basin Creek in the Highland Mountains about 20 miles south of Butte by road. The districts were organized soon after the discovery of placer gold on Fish Creek in 1866. Although some lodes were staked out even in the early days, the area has not been very active since the decline of the placers, except for the Butte-Highland Mine which was closed down by Federal Order L-208 in April, 1942, and has not been reopened. Lode and placer mining has been carried on intermittently, and total production is estimated to be valued at about $3,000,000, mostly in gold.

In this district a series of slates and quartzites of the Belt series underlie metamorphosed limestone, shale, and quartzite of Paleozoic age, all of which are cut by numerous intrusions of quartz monzonite, diorite, pegmatite, and aplite. The sediments are faulted and in the northern part or cut off by the 'granite' of the Boulder batholith. The thick series of quartzites and slates of the Belt series are host rocks to some small metaliferous deposits, but the more important mines are in the Paleozoic limestones. The granite probably underlies the Belt series as well as the Paleozoic rocks, as several outliers of granite have been observed jutting through the sediments of all ages in nearby areas. The diorite grades into normal quartz monzonite ('granite') but the aplite and pegmatite occur as dikes in granite and are clearly the result of differentiation within the granite magma.

In addition to placers, which are still worked in a small way, the district has many veins and irregular ore deposits, valued chiefly for their gold content. The Butte-Highland Mine, at the head of the main fork of Fish Creek, is in lower Paleozoic limestone. The ore occurs in veins, joints, chimneys, and quartz breccia zones, and although not directly on the contact, the ore in the deeper levels resembles ore of contact origin. Other veins are irregular and locally

faulted, the largest strikes about east and dips about 80° N. The Day and Harvey, near Moosetown, differed from other mines of the area in that its ores were more valuable for their silver content than for gold. Tungsten has been recently discovered in the contact zone near Lime Kiln Hill. Molybdenum has been found as molybdenite and molybdite associated with pyrite pegmatitic aplite in scattered occurrences about two miles north of Lime Kiln Hill.

Northwest of Moosetown, in the vicinity of Mt. Humbug, a large phosphate rock deposit is being developed in the Phosphoria formation.

The district contains a remarkable variety of minerals. Besides the common rock forming minerals orthoclase, plagioclase, quartz, hornblende, augite, biotite, muscovite, magnetite, zircon, apatite, titanite, rutile, kaolinite, chlorite, talc, calcite, and dolomite; there are contact minerals, garnet, zoisite, epidote, diopside, and actinolite; the pegmatite minerals green mica, tourmaline, and fluorite; the oxidized vein minerals malachite, azurite, chrysocolla, cuprite, cerussite, montanite, molybdite, native gold, native silver, hematite, limonite; the sulphide minerals, chalcopyrite, bornite, galena, pyrite, pyrrhotite, arsenopyrite, tetradymite, molybdenite, argentite, and pyragyrite, and the tungsten mineral powellite.

Melrose

The Melrose district is northeast of Melrose, a station on the Oregon Short Line Railroad about 28 miles south of Butte. It is drained by Camp and Soap Creeks, two tributaries of Big Hole River.

Melrose is on alluvium deposited by the Big Hole River. Eastward are eroded bench lands composed of flat-lying Tertiary deposits of sand, gravel, clay, and volcanic ash. Paleozoic limestones crop out in the foothills farther east. They strike northwest and dip from 45° to 60° southwest. The Paleozoic section includes all formations from the Flathead to the Madison inclusive. Pre-Beltian schist and quartzite and argillite of the Belt series occupy the area east of the Paleozoic rocks to the head of the creeks. Small stocks of quartz monzonite intrude other rocks in Soap Gulch and about 4 miles up Camp Creek. The Clipper vein on Wickeyup Creek, which is 4 to 10 feet wide, is in the Belt slates and strikes northwest and dips 30° NE. The ore consists of malachite, azurite, cuprite, and chalcopyrite in quartz in the oxidized zone and chalcopyrite and pyrite in quartz in the sulphide zone. Igneous rocks are exposed in this vicinity.

The King and Queen claims are between the heads of Camp and Soap Creeks. Some iron ore has been shipped from a blanket vein in quartzite to the Glendale smelter for fluxes.

The Pandora claim is below the flat-lying quartzite of the top of the ridge between Camp and Soap Creeks, overlooking Soap Gulch. Some lead-silver ore was shipped when the Glendale smelter was in operation.

The Gold King Mine, about 2 miles southwest of the Pandora, is on a chimney of ore in limestone, and ore has been mined vertically for 140 feet. The ore consists of iron stained quartz showing pyrite, galena, and some visible gold. Ores also carry silver and copper.

The principal silver deposit in Soap Gulch is about a third of a mile north of the Gold King. The deposits are in pre-Beltian schist. Horn silver is the principal ore mineral. The Emma Nevada Mine, northeast of Melrose, is in gray argillite of the Belt series. It is said to have produced $46,000 worth of horn silver ore from within 50 feet of the surface. The Old Glory, a mile north of the Emma Nevada, yielded about $100,000 in silver ore. The ore was cut off by a fault at a depth of 75 feet. The Little Group in Section 7, Township 2 South, Range 8 West

is in decomposed schist. The ledge carries copper and is 40 feet wide. The Christiansen Group is about half a mile northwest from the Little Group. The vein is in decomposed schist and consists of chalcopyrite in copper pitch ore. The richer ore is said to average 2½ feet wide, and the low grade, about 2% copper for a width of about 15 feet. The Glory Copper prospect is 1¼ miles north of the Christiansen Group. The ore consists of limonite intermixed with copper-pitch ore, partly filling the interstices of brecciated quartz and quartzite. Occasional specks of chalcopyrite, and stains of malachite and azurite are present.

Placer deposits, in gravels and sandy clays, are reported to contain from 5 cents to $3 in gold to the cubic yard. Gold is concentrated on top of thin clay partings. The gold is large enough to be easily recovered, but lack of water has prevented extensive washing of the gravels.

SOIL CONSERVATION DISTRICTS

A Soil Conservation District is a legal subdivision of the State, established by the farm and ranch owners and operators, which permits group action in dealing with the problems in soil erosion, moisture conservation, soil fertility, and land use.

The Montana State Soil Conservation District Law was passed by the 26th General Assembly on February 28, 1939, and gives the authority for organizing Soil Conservation Districts within the State. Under provisions of the Law, no district can be formed unless the people want it, nor unless they register this want; first by petition, and later by a favorable vote of at least 65 per cent of the qualified voters in the proposed district. The law also provides for the formation of a State Soil Conservation Comittee, which assists in the organization of districts and also in securing cooperation from State and Federal agencies.

The main governing body of a Soil Conservation District is the board of five supervisors who are elected by the people of the District. This board is empowered by the law to study the conservation problem of the district and to formulate programs to deal with these problems. This Board may call upon local, state, and federal agencies to assist in executing the district's program, and, by applying to the Board of Supervisors, farmers and ranchers may obtain such technical assistance as the District may have without expense to the operator. The use of other facilities, such as earth-moving equipment, owned, leased or contracted for by the districts, are made available at rates fixed by the Board of Supervisors.

In the State, at the present time, there are 59 Soil Conservation Districts organized, and 22 Cooperative Grazing Districts receiving technical assistance from the Soil Conservation Service in conducting conservation programs.

The Mile High Soil Conservation District was voted into existence by landowners and tenants in 1952. The district includes all of Silver Bow County and that portion of Deer Lodge County lying South of Township 5 North. The district in Silver Bow County comprises about 458,240 acres and includes approximately 164 farm and ranch units.

The Supervisors of the district were organized in January, 1952, and operate independent of the Federal Government in administering the affairs of the district. They have a working agreement with the U. S. Department of Agriculture that provides for technical assistance from the Soil Conservation Service. These technicians conduct soil, topographical, forage, and other studies in the district, in order to get basic land facts for use in establishing good sound conservation measures, from which the individual farmer and the entire district will derive the most benefit.

The annual work plans of the district have stressed guidance in proper use of the land presently available, establishment of sound conservation measures on these lands, and future measures to bring more land under development. Work done, so far, has consisted primarily of the following developments: reorganization of irrigation systems, developing new irrigation water supplies, drainage, stockwater development, and range management practices. Two of the main projects so far completed were the reorganization of one irrigation system serving five farms and involving approximately 1,000 acres of irrigated lands, and the other was the construction of a new seven mile irrigation canal which delivers water to about 2,000 acres.

Considerable time has been spent with private concerns and public agencies in studying methods of reclaiming smelter damaged lands, which is a serious conservation problem in this district.

One of the major problems is to reach the urban people, who comprise the large percentage of the total population of the district. To meet this end, the district is conducting an extensive educational program to make everyone conscious of conservation. As a result, the conservation program is gaining momentum constantly, and the future looks promising.

DEER LODGE NATIONAL FOREST

The Butte Ranger District, bisected by the Continental Divide and centrally located in the Deer Lodge National Forest, comprises nearly 200,000 acres of forest and range land. From Beaudines Crossing south to the Big Hole River on the west, and on the east from the Highlands south to Melrose, water flows southward to the Big Hole River which is a tributary of the Missouri River. North of Butte, the Missouri again claims the water, but this time the streams flow northward to the Boulder River and thence joins with the southern supply via the Jefferson River which flows into the Missouri.

Silver Bow Creek (officially known as Clark Fork) picks up water from the mines and city and flows westward toward Anaconda where it is recharged with smelter wastes. This creek and its tributaries, which are Brown's Gulch and Hail Columbia Gulch on the north and German Gulch coming from the south, drains approximately one-third of the Butte Ranger District into the Columbia River drainage basin.

The mining industry and the type of exploitations of natural resources that is prevalent in mining districts has left a mark on surrounding National Forest lands. Smelter-kill to the eastward, and heavy fuel wood and mining timber cutting on all timbered slopes, has left only a few inaccessible areas untouched by a woodsman's axe. Much of this cut-over land has recovered and is now producing merchantable material in second growth fir and lodge-pole pine stands.

Heavy grazing in the past by mine horses and sheep had heavily overgrazed grass ranges at lower elevations. Much of this range is now in private ownership and remains in a depleted condition because of continued use by all types of stock.

The high elevation ranges are mostly within the National Forest and with intensive management and control of domestic livestock using these ranges, most are in fair to good condition. There are about 3,000 head of cattle and 1,000 head of sheep now distributed upon fourteen different grazing allotments. The season of use varies between allotments, but generally is from June 15 to October 15. In order to maintain these ranges and secure our primary objective of water production, at least half of the available forage is to be left each year.

Nearly all of these cattle are "preference" in that the number permitted will not vary from year to year. Each preference permit is designed to fit into an economic unit of ranching

and gives a sound base for the ranching industry dependent upon the National Forest summer ranges. A definite fee is charged for this use.

Good, healthy watershed conditions are the goal in National Forest management. It is the district ranger's primary job to coordinate all uses on the National Forests so that these watersheds remain healthy and continue to produce the necessary water supply for the people and industries of Butte and vicinity. A constant and pure supply of domestic water, which is derived directly from the National Forest watersheds, is supplied to Butte (150 million gallons daily) by a system of three reservoirs and pumping stations.

The timber business on the Butte District has fluctuated from an extreme high during the fuel wood and charcoal days to near the other extreme of no production when the smelter moved to Anaconda and the mines began using sawed timbers shipped from western sawmills. Timber activity is increasing today as markets are created for power poles and pulpwood. All timber removed from the National Forest lands on the Butte District is part of a management plan to leave the stand in better condition and to provide for adequate regeneration to insure watershed values. Provisions are made for sufficient money to be deposited with each sale to dispose of the brush resulting from logging in order to reduce the danger of uncontrolled burning of adjacent stands and reproduction. On areas where soils are unstable and accelerated erosion may result from logging, additional money is deposited by the logger to construct such drainage structures and dams that will control any destructive erosion.

Revenues collected from the sale of National Forest timber and grass or any other source are divided so that the county receives, through the State, 25% for use in schools and roads, and 10% is returned to the Deer Lodge Forest for forest roads and trails. The remainder is returned to the Treasurer of the United States. Today, nationwise, the Forest Service receipts exceed its expenditures.

One of the larger elk herds of Montana can be found within twenty miles of the City of Butte. In some areas the big game has built up a population in sufficient numbers to cause alarm among the natural resource managers. Both elk and deer will have to be reduced by adequate hunter kill if a maintenance level of big game feed is to be retained.

Use of the National Forest land for recreational purposes is a value upon which it is hard to place a dollar sign. Sportsmen's activities make up but a small percentage of the total visits to the National Forest lands on the Butte District. In 1954, approximately 670,000 individual trips for picnics and camping were made to the public campgrounds. In addition, there were probably a great number of people who did not stop at one of three improved picnic grounds, but found a quiet spot off the regular traveled routes and enjoyed a day in the out-of-doors.

From around May 1 to September 30 of each year district personnel is increased to control any fire that may occur within the protection boundary. This force consists of two look-outs, Haystack Mountain and Highland Peak, and two fireguards stationed in Butte, besides the ranger, his assistant and maintenance crew.

Communication is provided by an efficient two-way radio net. With this organization the Butte Ranger District has suffered only minor losses of forest acreage in the past two years. Through fast and efficient fire control, watershed values are maintained which directly benefit everyone.

Natural resources, with which the Ranger District is concerned, are all renewable. Wise use of these forest resources through supervised logging, controlled grazing, erosion check on unstable soils, hunter harvest of overpopulated big game herds, and forest fire control, will insure an efficient watershed and provide for multiple use of all of the resources available from your National Forests.

SUMMARY OF IRRIGATED LAND BY RIVER BASINS IN THE FOLLOWING COUNTIES COMPLETED TO DATE

Big Horn, Carbon, Custer, Deer Lodge, Gallatin, Golden Valley, Madison, Meagher, Musselshell, Park, Rosebud, Silver Bow, Stillwater, Sweet Grass, Treasure, Wheatland, and Yellowstone

RIVER BASIN	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Missouri River Drainage Basin			
***Missouri River**	4,126	1,512	5,638
Jefferson River	34,735	6,388	41,123
Beaverhead River	7,367	1,815	9,182
Ruby River	33,404	4,261	37,665
Big Hole River	23,775	1,950	25,725
Madison River	39,445	7,660	47,105
Gallatin River	111,914	21,097	133,011
Smith River	30,304	18,398	48,702
Musselshell River	64,789	57,870	122,659
Grand Total Missouri River Basin	349,859	120,951	470,810
Yellowstone River Drainage Basin			
Yellowstone River	299,053	96,088	395,141
Stillwater River	27,489	16,403	43,892
Clarks Fork River	91,768	24,195	115,963
Big Horn River	65,395	25,579	90,974
Tongue River	22,137	7,479	29,616
Powder River	8,264	1,804	10,068
Grand Total Yellowstone River Basin	514,106	171,548	685,654
Columbia River Drainage Basin			
Clark Fork (Deer Lodge, Hellgate) River	15,636	1,438	17,074
Grand Total Columbia River Basin	15,636	1,438	17,074
Grand Total in the Counties Completed to Date	879,601	293,937	1,173,538

*Names of streams indented on the lefthand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF SILVER BOW COUNTY BY RIVER BASINS

REGULAR IRRIGATION—Missouri River Basin	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
*Missouri River	0	0	0
Jefferson River	61	0	61
Big Hole River	2,272	3	2,275
Johnson Creek	0	20	20
Granulated (Cat) Creek	0	10	10
Jimmie New Creek	154	16	170
Charcoal Creek	30	0	30
Divide Creek	440	48	488
North Fork	262	0	262
East Fork	95	0	95
Unnamed Branch	43	0	43
Beaudine Creek	88	0	88
Climax Gulch Creek	70	0	70
Unnamed Creek	0	0	0
Unnamed Spring	1	0	1
Freeze Out Gulch Creek	100	0	100
Unnamed Creek	35	0	35
Unnamed Creek	0	0	0
Unnamed Branch	0	0	0
Unnamed Spring	43	0	43
Tucker Creek	110	0	110
Camp Creek	84	0	84
Fish Creek	248	69	317
Grand Total Regular Irrigation—Missouri River Basin	4,144	166	4,310

FLOOD IRRIGATION—Missouri River Basin			
Missouri River	0	0	0
Jefferson River	0	0	0
Big Hole River	0	0	0
Divide Creek	4	0	4
Beaudine Creek	0	0	0
Curly Creek	27	0	27
Moose Creek	237	0	237
Camp Creek	51	35	86
Dry Creek	35	0	35
Fish Creek	25	0	25
Little Fish Creek	54	0	54
Grand Total Flood Irrigation—Missouri River Basin	433	35	468

*Names of streams indented on the lefthand margin indicate that they are tributaries of the first stream named above which is not indented.

IRRIGATION SUMMARY OF SILVER BOW COUNTY BY RIVER BASINS

REGULAR IRRIGATION—Columbia River Basin	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Deer Lodge (Clark Fork) River	0	0	0
Silver Bow Creek	0	0	0
Blacktail Deer Creek	168	0	168
Sawmill Creek	8	0	8
Little Blacktail Creek	15	0	15
Unnamed Spring	18	0	18
Unnamed Creek	10	0	10
Unnamed Spring	0	6	6
Basin Creek	15	15	30
China Gulch Creek	10	0	10
Standly Creek	10	0	10
Little Basin (Porter) Creek	0	0	0
Unnamed Springs	1	0	1
Sand Creek	0	0	0
Smith Gulch Creek	45	0	45
Saw Mill Gulch (Park Canyon) Creek	10	0	10
Muddy Creek	0	0	0
Rock Spring	37	0	37
Browns Gulch Creek	745	53	798
Unnamed Spring	2	0	2
Flume Gulch Creek	17	0	17
Telegraph Gulch Creek	33	0	33
Meadow Gulch Creek	59	0	59
Hail Columbia Gulch	65	0	65
Unnamed Spring	15	0	15
Unnamed Spring	3	0	3
Sheep Gulch Creek	90	10	100
Bull Run Gulch Creek	33	0	33
Unnamed Spring	46	0	46
Chinamans Spring	116	0	116
McCleery Gulch Creek	0	0	0
Little Gulch Creek	21	0	21
Dry Gulch Creek	14	0	14
German Gulch Creek	106	173	279
Well	13	0	13
White Pine Creek	35	0	35
Grand Total Regular Irrigation—Columbia River Basin	1,765	275	2,040

IRRIGATION SUMMARY OF SILVER BOW COUNTY BY RIVER BASINS

FLOOD IRRIGATION—Columbia River Basin	Present Irrigated Acres	Irrigable Acres Under Present Facilities	Maximum Irrigable Acres
Deer Lodge (Clark Fork) River	0	0	0
Silver Bow Creek	0	0	0
Blacktail Deer Creek	135	0	135
Unnamed Spring	0	3	3
Basin Creek	0	3	3
Herman (Stratton) Gulch Creek	5	0	5
Little Basin (Porter) Creek	53	20	73
Unnamed Branch	0	10	10
Sand Creek	0	0	0
Hansen Gulch Creek	0	0	0
Certain Springs	9	0	9
Powder Gulch Creek	28	0	28
Price's Gulch Creek	0	0	0
Sawmill Gulch	20	0	20
Browns Gulch Creek	185	0	185
Unnamed Spring	7	0	7
Meadow Gulch Creek	20	0	20
Hail Columbia Gulch Creek	57	0	57
Bull Run Gulch Creek	18	0	18
Bull Run Spring	20	0	20
McCleery Gulch Creek	26	0	26
German Gulch Creek	0	0	0
Norton Gulch Creek	7	0	7
Gregson Creek	30	0	30
Flint Creek	36	7	43
Hensley Gulch Creek	8	42	50
Grand Total Flood Irrigation—Columbia River Basin	664	85	749
Grand Total Regular and Flood Irrigation (Missouri River Basin) in Silver Bow County	4,577	201	4,778
Grand Total Regular and Flood Irrigation (Columbia River Basin) in Silver Bow County	2,429	360	2,789
Grand Total All Irrigation in Silver Bow County	7,006	561	7,567

WATER RIGHT DATA—SILVER BOW COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
MISSOURI RIVER BASIN							
***Missouri River**	0	0	0				
Jefferson River	0	0	0				
Big Hole River	43	663,992	16,599.800				
Allen Hay Creek	(See Big Hole River)						
Johnson Creek	3	1,580	39.500				
East Fork Johnson Creek	(See Johnson Creek)						
Jimmie New Creek	3	1,150	28.750				
Jerry Creek	45	44,490	1,112.250				
Right Hand Fork Jerry Creek	(See Jerry Creek)						
Left Hand Fork Jerry Creek	(See Jerry Creek)						
West Fork Jerry Creek	(See Jerry Creek)						
Upper West Branch Jerry Cr.	(See Jerry Creek)						
East Fork Jerry Creek	(See Jerry Creek)						
Spring on West Bank Jerry Cr.	(See Jerry Creek)						
Jerry Creek & German Gulch & Branches	(See Jerry Creek)						
Shamrock Creek	(See Jerry Creek)						
One Flatt or Extinct Lake	1	400	10.000				
Lake, Springs and Swamps	1	200	5.000				
Long Tom & Labree Creeks	1	160	4.000				
Charcoal Creek	5	980	24.500				
Right Hand Charcoal Creek	1	160	4.000				
Little Creek	1	0	0				
Divide Creek	39	11,200	280.000	A-6450	17	1,765	44.125
Middle Fork Divide Creek	(See Divide Creek)						
Right Fork Divide Creek	(See Divide Creek)						
North East Fork Divide Creek	(See Divide Creek)						
Branch Divide Creek	(See Divide Creek)						
South East Fork Divide Creek	(See Divide Creek)						
Divide Gulch	(See Divide Creek)						
Timber Gulch Creek	(See Divide Creek)						
Black Canon Creek	(See Divide Creek)						
Felix O'Neil Creek	(See Divide Creek)						
Hood & Kinney Creeks	(See Divide Creek)						
Lavalle Creek	(See Divide Creek)						
Mill Creek	(See Divide Creek)						
Mud Creek	(See Divide Creek)						
Poplar Gulch Creek	(See Divide Creek)						
Rabitaille Creek	(See Divide Creek)						
Willow Creek	(See Divide Creek)						
North Fork Divide Creek	3	1,550	38.750				
Hancock Creek	1	0	0				
Summit Gulch Creek	1	50	1.250				
South Fork Divide Creek	4	3,500	87.500	A-6450	(See Divide Creek)		
Unnamed Spring & Gulch	1	10	.250				
East Fork Divide Creek	5	200	5.000	A-6450	(See Divide Creek)		
Pine Creek	2	100	2.500				

*Names of streams indented on the lefthand margin indicate that they are tributaries of the first stream named above which is not indented.

WATER RIGHT DATA—SILVER BOW COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Spring	1	40	1.000				
Beaudin (Curly) Creek	2	200	5.000	A-6450	(See Divide Creek)		
Spring Creek	3	230	5.750				
Climax Gulch Creek	1	100	2.500				
Fly Gulch Creek	3	900	22.500	A-6450	(See Divide Creek)		
Crazy Swede Creek	1	200	5.000				
Unnamed Creek	1	80	2.000				
Freeze Out Gulch Creek	2	300	7.500	A-6450	(See Divide Creek)		
Unnamed Springs	2	200	5.000				
Unnamed Spring	1	40	1.000				
Unnamed Gulch Creek	1	200	5.000				
Tucker Creek	2	500	12.500	A-6450	(See Divide Creek)		
Little Tucker Creek	2	480	12.000				
Unnamed Springs	2	80	2.000				
Water Gulch Creek	1	300	7.500	A-6450	(See Divide Creek)		
Saw Mill Creek	2	175	4.375				
Spring Gulch Creek	1	10	.250				
Moose Creek	34	24,040	601.000				
Left Fork Moose Creek	(See Moose Creek)						
South Fork Moose (Twin) Creek	(See Moose Creek)						
Badger Creek	(See Moose Creek)						
Olsen Creek	(See Moose Creek)						
Perry Run or Gulch	(See Moose Creek)						
Tunnel Gulch	(See Moose Creek)						
Clark Gulch	0	0	0				
Clark Gulch Spring	1	160	4.000				
Cache Gulch Creek	1	50	1.250				
Dodge Gulch Creek	1	400	10.000				
Jennie Creek	2	140	3.500				
Hazel (Mabel) Creek (Spring Brook)	4	240	6.000				
Soap Gulch Creek	9	1,590	39.750				
North Fork Soap Gulch Creek	1	0	0				
Camp Creek	18	3,075	76.875	1134[1]	10	1,380	34.500
Willow Creek	(See Camp Creek)						
Unnamed Branch	(See Camp Creek)						
Unnamed Spring	(See Camp Creek)						
Little Camp Creek	4	450	11.250				
Wickeyup Creek	4	350	8.750				
North East Fork of Wickeyup Creek	(See Wickeyup Creek)						
West Fork of Wickeyup Creek	(See Wickeyup Creek)						
Moffet Gulch Creek	3	200	5.000				
Waste and Seepage	1	200	5.000				
Missouri River	0	0	0				
Jefferson River	0	0	0				
Dry Creek	5	770	19.250				
Little Cherry Creek	1	100	2.500				
Little Dry Creek Spring	1	120	3.000				
Unnamed Spring	1	40	1.000				
Little Cherry Springs	1	100	2.500				

WATER RIGHT DATA—SILVER BOW COUNTY
APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Sand Hollow Spring	2	180	4.500				
Clark's Spring	2	180	4.500				
Fish (Highland) Creek	20	22,280	557.000	2221[2]	5	600	15.000
Left Hand Fork Highland Gulch Creek	(See Fish Creek)						
High Creek	(See Fish Creek)						
Kelley Gulch Creek	(See Fish Creek)						
Two Heart Creek	(See Fish Creek)						
Wigwam Gulch Creek	(See Fish Creek)						
Unnamed Creek	1	100	2.500				
Humbug Creek	1	280	7.000				
Hope Gulch Creek	3	470	11.750				
Ballaret Tunnel Creek	4	140	3.500				
Spring Creek	3	100	2.500				
Crystal (Rocky) Spring	4	0	0				
Unnamed Spring	1	40	1.000				
Mammoth Gulch Creek	2	1,200	30.000				
South Fork Mammoth Gulch	1	1,000	25.000				
West Fork Mammoth Gulch	1	500	12.500				
Roaring Brook (Creek) (Rutter's Gulch)	8	2,850	71.250				
Mill Creek	1	160	4.000				
Little (Right Fork) Fish Creek	6	1,230	30.750				
South Fork Little Fish Creek	1	0	0				
Pipestone Creek	0	0	0	3234[1]	2	40	1.000
Little Pipestone Creek	2	240	6.000				
Unnamed Creek	2	240	6.000				
Unnamed Spring	1	10	.250				
Section House Creek	1	40	1.000	3234[3]	(See Pipestone Cr.)		
Toll Canyon Creek	0	0	0	3234[3]	(See Pipestone Cr.)		
Total	346	797,022	19,925.550		34	3,785	94.625

WATER RIGHT DATA—SILVER BOW COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
COLUMBIA RIVER BASIN							
Deer Lodge River (Clark Fork of Columbia River)	3	2,100	52.500				
Joiner Gulch Creek	(See Deer Lodge River)						
Silver Bow Creek	57	45,735	1,143.375				
Unnamed Creek	(See Silver Bow Creek)						
Chelsea Gulch Creek	(See Silver Bow Creek)						
Cottonwood Canyon Creek	(See Silver Bow Creek)						
Doran Gulch Creek	(See Silver Bow Creek)						
Holts Creek	(See Silver Bow Creek)						
Swift Creek	(See Silver Bow Creek)						
Mill Creek	(See Silver Bow Creek)						
Miles Creek	(See Silver Bow Creek)						
Old Placer Creek	(See Silver Bow Creek)						
Reese Gulch Creek	(See Silver Bow Creek)						
Valentine Creek	(See Silver Bow Creek)						
Waters Wehish Gulch Creek	(See Silver Bow Creek)						
Highland Spring	(See Silver Bow Creek)						
Yankee Doodle Gulch Creek	14	4,620	115.500	1687	1	20	500
Park Creek	(See Yankee Doodle Creek)						
Jack Lingle Creek	(See Yankee Doodle Creek)						
Pilgrim Gulch Creek	2	480	12.000				
Unnamed Spring	1	6	.150				
Right Hand Fork Pilgrim Gulch Creek	1	0	0				
Moulton Ditch Gulch	1	10	.250				
Unnamed Springs	2	4,000	100.000				
Unnamed Spring and Creek	1	80	2.000				
Dixie Creek	4	1,400	35.000				
Poplar Grove Gulch Creek	3	170	4.250				
Dromedary Creek	1	20	.500				
Unnamed Spring	1	0	0				
Butte London Mining Spring	1	3	.075				
Eldorado Spring	1	0	0				
Elk Park Canyon Creek	6	325	8.125				
Atlantic Pacific Tunnel	1	100	2.500				
Unnamed Springs	1	5	.125				
Horse Canyon (Moose) Creek	7	1,530	38.250				
North Branch Horse Canyon Creek	1	0	0				
Fairweather Gulch Creek	1	400	10.000				
Blacktail Deer Creek	41	7,355	183.875	28162	4	296	7.400
Unnamed Creek	(See Blacktail Deer Creek)						
West Branch Blacktail Creek	(See Blacktail Deer Creek)						
East Blacktail Creek	(See Blacktail Deer Creek)						
Unnamed Springs	(See Blacktail Deer Creek)						
Butte Valley Creek	(See Blacktail Deer Creek)						
Dead Man's Canyon Creek	(See Blacktail Deer Creek)						
Baxter Creek	(See Blacktail Deer Creek)						
South Baxter Creek	(See Blacktail Deer Creek)						
Durham Canyon Creek	(See Blacktail Deer Creek)						
Timber Butte Gulch Creek	(See Blacktail Deer Creek)						

WATER RIGHT DATA—SILVER BOW COUNTY
APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
West Spring	1	125	3.125				
East Spring	1	125	3.125				
Estel Placer Creek	1	100	2.500				
Unnamed Spring	1	80	2.000				
Little Blacktail Deer Creek	3.	1,600	40.000				
Black Cliff Spring	1	40	1.000				
Unnamed Springs	1	12	.300				
Gerald Spring	1	8	.200				
Unnamed Creek	1	20	.500				
Plymouth Rock Creek	1	400	10.000				
Unnamed Spring	1	40	1.000				
Lucky Strike Gulch Creek	1	40	1.000				
Wendel Canyon Creek	1	100	2.500				
Unnamed Creek	1	40	1.000				
Unnamed Spring	2	30	.750				
Leslie Gulch (Maude S. Canyon) Creek	3	200	5.000				
Unnamed Spring	1	5	.125				
Cherry (Brookside, Cottonwood Gulch) Creek	3	170	4.250				
Unnamed Springs	3	50	1.250				
Ruth Spring	1	20	.500				
Unnamed Spring	1	50	1.250				
Silver Park Creek	1	36	.900				
Plymouth Rock Gulch Creek	1	200	5.000				
Basin Gulch Creek	35	5,995	149.875	38575	4	195	4.875
Goggin Gulch Creek	(See Basin Creek Gulch)						
Green Gulch Creek	(See Basin Creek Gulch)						
Main Ripple Tunnel	1	800	20.000				
Two Bit Gulch	2	200	5.000				
Secret Creek	1	0	0				
China Creek	1	100	2.500				
Unnamed Spring	1	0	0				
Standly Creek	3	200	5.000				
Freeman Canyon	0	0	0				
Unnamed Springs	3	40	1.000				
Unnamed Spring	1	5	.125				
Little Basin (Porter) Creek	12	4,345	108.625				
Duffy's Gulch Creek	(See Little Basin Creek)						
Unnamed Creek	1	80	2.000				
Central Branch (Left Fork) Little Basin Creek	2	190	4.750				
Unnamed Springs	1	60	1.500				
Right Fork of Center Branch Little Basin Creek	1	150	3.750				
Unnamed Spring	1	200	5.000				
Unnamed Spring	1	20	.500				
French Gulch (Tramway Gulch) Creek	3	100	2.500				
Unnamed Spring	2	20	.500				
Saratoga Creek (China Gulch)	3	90	2.250				

WATER RIGHT DATA—SILVER BOW COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Dew Drop Springs	1	500	12.500				
Nontford Spring	1	40	1.000				
Spring Branch	2	20	.500				
Dakota Street Storm Sewer	1	200	5.000				
Grove Gulch (Spring) Creek	11	2,990	74.750	3738	1	All	
West Tributary Grove Gulch	(See Grove Gulch Creek)						
Branch Grove Gulch	(See Grove Gulch Creek)						
Unnamed Creek	(See Grove Gulch Creek)						
Unnamed Spring	1	All					
Cooper Stream	1	100	2.500				
Missoula Gulch Creek	12	500	12.500				
Buffalo Gulch Creek	(See Missoula Gulch Creek)						
Dell Water Right	(See Missoula Gulch Creek)						
Unnamed Spring	1	50	1.250				
Mill Gulch Creek	1	0	0				
Missoula Spring	1	0	0				
Butte Gulch	1	0	0				
Unnamed Creek	1	250	6.250				
Excelsior Spring	1	0	0				
Whiskey Gulch Creek	2	100	2.500				
South Butte Spring	1	3	.075				
May Street Spring	1	40	1.000				
Big Butte Spring	2	40	1.000				
Unnamed Spring	1	0	0				
I. X. L. (Fish) Creek	10	635	15.875				
Canada (Nelson Gulch) Creek	2	100	2.500				
Hyde Park Gulch Creek	1	100	2.500				
I. X. L. Spring	1	100	2.500				
Unnamed Spring	1	20	.500				
Gimlet Gulch Creek	9	331	8.275				
Head South Fork Gimlet Gulch Creek	(See Gimlet Gulch Creek)						
North Branch Gimlet Gulch Creek	(See Gimlet Gulch Creek)						
Unnamed Spring	(See Gimlet Gulch Creek)						
Powder Brush Spring	1	40	1.000				
Unnamed Spring	1	0	0				
Unnamed Spring	1	25	.625				
Oleson Spring	1	25	.625				
Nissler Spring	1	800	20.000				
Warm Mineral Spring	1	0	0				
Unnamed Spring	1	50	1.250				
Sand Creek	5	550	13.750				
Big Sandy Creek	(See Sand Creek)						
Calumet Creek	(See Sand Creek)						
Jones Gulch Creek	(See Sand Creek)						
Placer Gulch Creek	(See Sand Creek)						
Seven Springs Creek	1	400	10.000				
Unnamed Spring	1	100	2.500				
Hansen Gulch Creek	0	0	0				
Rose Gulch Creek	1	160	4.000				
Unnamed Spring	1	0	0				

WATER RIGHT DATA—SILVER BOW COUNTY

APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Sheep Gulch Creek	2	125	3.125				
Smith Gulch Creek	2	180	4.500				
Saw Mill Gulch (Park Canyon) Creek	5	800	20.000				
William Spring	1	7	.175				
Muddy Creek	1	80	2.000				
Willow Creek Springs	3	240	6.000				
Rock Spring	1	100	2.500				
Unnamed Springs	2	5	.125				
Saw Mill (Saw Pit Canyon) Creek	4	210	5.250				
Unnamed Springs	1	4,000	100.000				
Spring Creek	1	50	1.250				
Unnamed Springs	1	100	2.500				
Powder Gulch Creek	6	545	13.625				
Powder Gulch Spring	1	20	.500				
Spring Branch	2	80	2.000				
Cooper Spring	1	75	1.875				
Prices Gulch Creek	5	5,280	132.000				
Brown's Gulch Creek	51	14,006	350.150	33162	30	1,193	29.852
Middle Fork Brown's Gulch Creek	(See Brown's Gulch Creek)						
Left Hand Brown's Gulch Creek	(See Brown's Gulch Creek)						
Elgen Gulch Creek	(See Brown's Gulch Creek)						
Coni Gulch Creek	(See Brown's Gulch Creek)						
Unnamed Spring	(See Brown's Gulch Creek)						
Mary's Gulch Creek	(See Brown's Gulch Creek)						
Unnamed Springs	1	20	.500				
Alaska Gulch (Saw Mill, Spring) Creek	4	650	16.250	33162	(See Brown's Gulch Creek)		
Brown's Gulch Springs	1	10	.250				
Flume Gulch (Mill, Miner's, Saw Mill Gulch) Creek	12	975	24.375	33162	(See Brown's Gulch Creek)		
Unnamed Springs	5	550	13.750				
Rocky Canyon Creek	1	150	3.750				
Unnamed Spring	1	10	.250				
Strassi Gulch (Champion) Creek	1	1,000	25.000				
Strassi Spring	1	1,000	25.000				
Chute Gulch Creek	2	40	1.000				
Telegraph Gulch Creek	4	695	17.375	33162	(See Brown's Gulch Creek)		
North Fork Telegraph Gulch Creek	1	25	.625				
Unnamed Springs	2	70	1.750	33162	(See Brown's Gulch Creek)		
Unnamed Creek	2	340	8.500				
Unnamed Springs	3	56	1.400				
Meadow Gulch Creek	4	170	4.250	33162	(See Brown's Gulch Creek)		
Cold Gulch	0	0	0				

WATER RIGHT DATA—SILVER BOW COUNTY
APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Unnamed Spring	1	40	1.000				
Rocky Mountain Spring	1	80	2.000				
North Side Spring	1	50	1.250				
Hail Columbia Gulch Creek	10	1,394	34.850	33162		(See Brown's Gulch Creek)	
Butcher Gulch Creek	(See Hail Columbia Gulch Creek)						
Crystal Spring Creek	(See Hail Columbia Gulch Creek)						
Solo Gulch Creek	(See Hail Columbia Gulch Creek)						
West Side Spring	(See Hail Columbia Gulch Creek)						
Unnamed Spring	1	40	1.000				
Lipson's Canyon Spring	1	40	1.000				
Sheep Gulch Creek	0	0	0	33162		(See Brown's Gulch Creek)	
Unnamed Spring	2	50	1.250				
Bull Run Creek	9	5,670	141.750	33162		(See Brown's Gulch Creek)	
Unnamed Spring	(See Bull Run Creek)						
Bull Run Spring	1	500	12.500				
Unnamed Creek	1	25	.625				
Unnamed Spring	1	All					
Unnamed Creek	1	0	0				
Oro Fino Gulch Creek	3	225	5.625	33162		(See Brown's Gulch Creek)	
Orr Spring	(See Oro Fino Gulch Creek)						
Middle (Straight) Gulch Creek	1	0	0				
Eagle Lode Spring	1	30	.750				
Quinn Spring & Stream	1	4	.100				
Gold Flint Creek	1	40	1.000				
Warm Springs	1	0	0				
Unnamed Creek	1	50	1.250				
Luke Spring	1	3	.075				
Birdsell Spring	2	0	0				
McClerry Gulch Creek	2	220	5.500				
Little Gulch Creek	1	10	.250				
Gopher Spring	1	120	3.000				
Dry Gulch	0	0	0				
Dry Gulch Springs	1	4,000	100.000				
Orchard Gulch Creek	1	60	1.500				
Lone Tree Gulch Creek	4	206	5.150				
Saw Mill Gulch Creek	1	40	1.000				
Unnamed Springs	2	80	2.000				
Unnamed Spring	1	3	.075				
Unnamed Spring	1	3	.075				
German Gulch Creek	21	37,820	945.500				
Right Hand Fork German Gulch Creek	(See German Gulch Creek)						
Unnamed Gulches	(See German Gulch Creek)						

WATER RIGHT DATA—SILVER BOW COUNTY
APPROPRIATIONS AND DECREES BY STREAMS

STREAM	APPROPRIATIONS (Filings of Record) No. of Filings	Miner's Inches	Cu. Ft. Per Sec.	DECREED RIGHTS Case No.	No. of Decrees	Miner's Inches	Cu. Ft. Per Sec.
Greenland Creek	3	1,600	40.000				
Upper Greenland Creek	1	600	15.000				
Beef Straight (Strait) Gulch Creek	14	164,600	4,115.000				
Minnesota Creek	9	22,560	564.000				
Right Branch Minnesota Creek	1	400	10.000				
Spring Creek	1	100	2.500				
North Fork Beef Straight Gulch Creek	1	500	12.500				
American Gulch Creek	4	1,060	26.500				
California Gulch Creek	2	0	0				
Norton Gulch Creek	1	0	0				
Right Hand Fork Norton Gulch Creek	1	480	12.000				
White Pine Creek	4	960	24.000				
Unnamed Spring	1	25	.625				
Gregson Creek	2	820	20.500				
Lake Gregson	1	50	1.250				
Drain	1	5	.125				
Unnamed Springs	10	85	2.125				
Flint Creek	4	585	14.625				
Sheep Gulch Creek	0	0	0				
Sheep Gulch Spring	1	40	1.000				
Unnamed Creek	1	80	2.000				
Spring Creek	1	40	1.000				
Unnamed Creek	1	100	2.500				
Hensley Gulch Creek	1	100	2.500				
Perdee Gulch Creek	1	50	1.250				
Homestead Creek	1	40	1.000				
Waite (Whitcraft Gulch) Creek	1	40	1.000				
Total	623	370,081	9,252.025		40	1,704	42.600

1. Decree for Camp Creek located in Madison County Courthouse. Numbers of decrees listed pertain to Silver Bow County alone or both Silver Bow and Madison Counties.
2. Decree for Fish Creek located in Jefferson County Courthouse. Number of decrees listed pertain to Silver Bow County alone, both Silver Bow and Jefferson Counties, or Silver Bow, Jefferson, and Madison Counties.
3. Decree for Pipestone Creek located in Jefferson County Courthouse. Number of decrees listed pertain to Silver Bow County only.

WATER RIGHT DATA—SILVER BOW COUNTY
APPROPRIATIONS AND DECREES BY STREAMS

STREAM	No. of Filings	Miner's Inches	Cu. Ft. Per Sec.
Drainages in Silver Bow County not located.			
Arena Gulch Creek	1	40	1.000
Bear Gulch Creek	3	3,000	75.000
Blue Gulch Creek	1	80	2.000
Brooks Spring	1	33	.825
Canon Creek	1		
Carpo Creek	1	2,500	62.500
Carpps Creek	1	1,500	37.500
Cooney Gulch Spring	1	30	.750
Crystal Spring	2	40	1.000
Cunningham Spring	1	50	1.250
Doors Springs	1	9.5	.2375
Eagle Gulch Spring	1	150	3.750
Gold Spar Spring	1		
Grizzly Creek	1		
Ling Creek	1	400	10.000
Madison Gulch Creek	2	400	10.000
Mill Gulch Creek	1	500	12.500
McGurnis Creek	1		
Mountain Spring	1	4	.100
Nat Johnson Spring	1		
Newell Gulch Creek	1	12	.300
Pine Tree Spring	1	2	.050
Pretty Tree Gulch Creek	1	200	5.000
Pride of Hill Spring	1	25	.625
Ranch Creek	1		
Red Hill Spring	1	12	.300
Rye Patch Creek	1		
Saw Mill Creek	3	500	12.500
Seymour Creek	1	24	.600
Sheep Gulch Creek	4	610	15.250
Snow Gulch Creek	1	300	7.500
Spring Gulch Creek	9	645	16.125
Summit Gulch Creek	1	200	5.000
Sunrise Springs	1	4	.100
Unnamed Creeks	8	510	12.750
Unnamed Springs	28	1,250	31.250
Visetti's Spring	1	40	1.000
Warms Spring	1		
Washington Gulch Creek	1		
Total	90.	13,070.5	326.7625

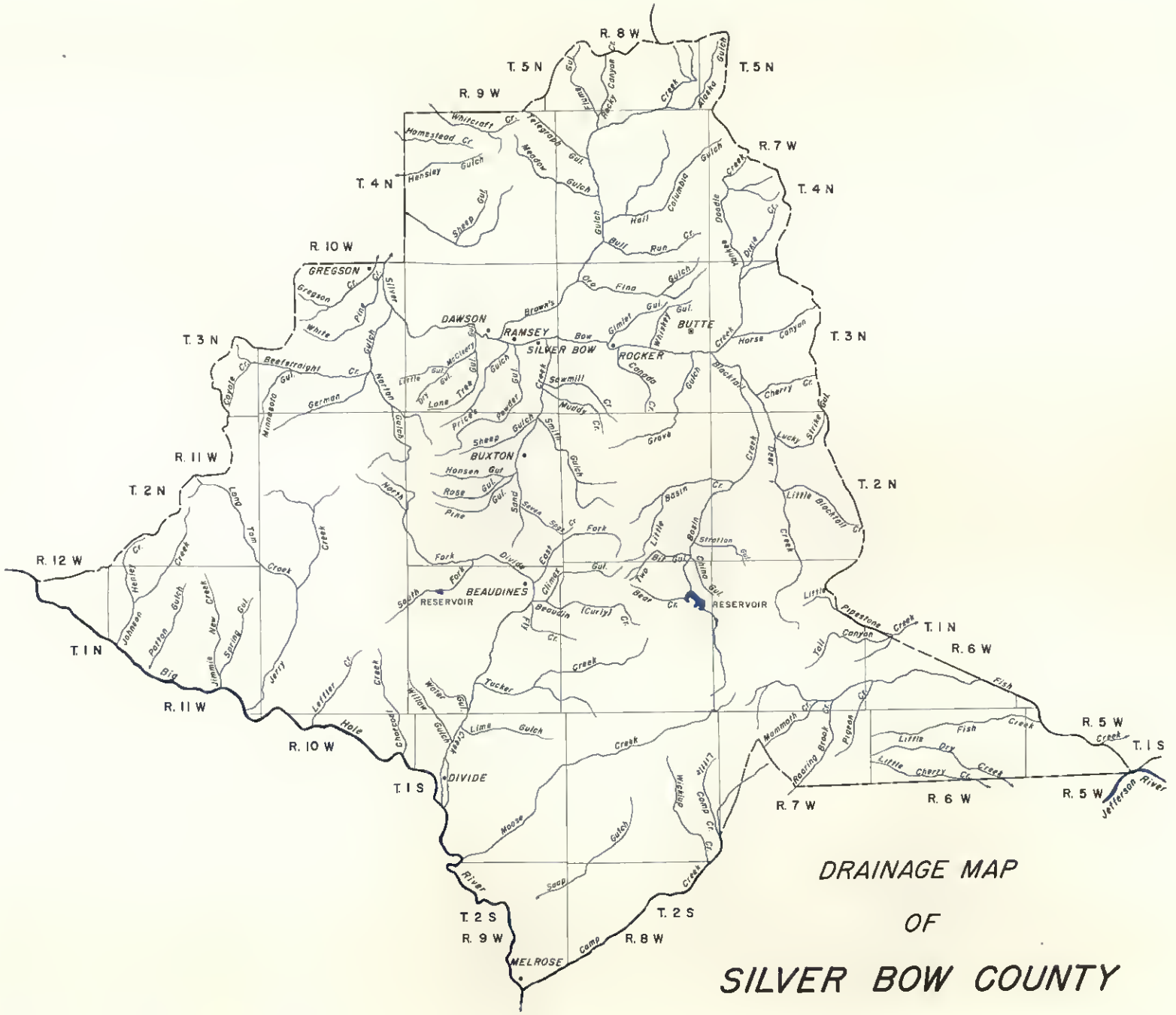
WATER RESOURCES SURVEY

Silver Bow County, Montana

Part II

Maps Showing Irrigated Areas

Published by
STATE ENGINEER'S OFFICE
Helena, Montana
June, 1955



DRAINAGE MAP OF SILVER BOW COUNTY

MAP INDEX

MAP SYMBOL INDEX

BOUNDARIES

- COUNTY LINE
- NATIONAL FOREST LINE

DITCHES

- CANALS OR DITCHES
- DRAIN DITCHES
- PROPOSED DITCHES

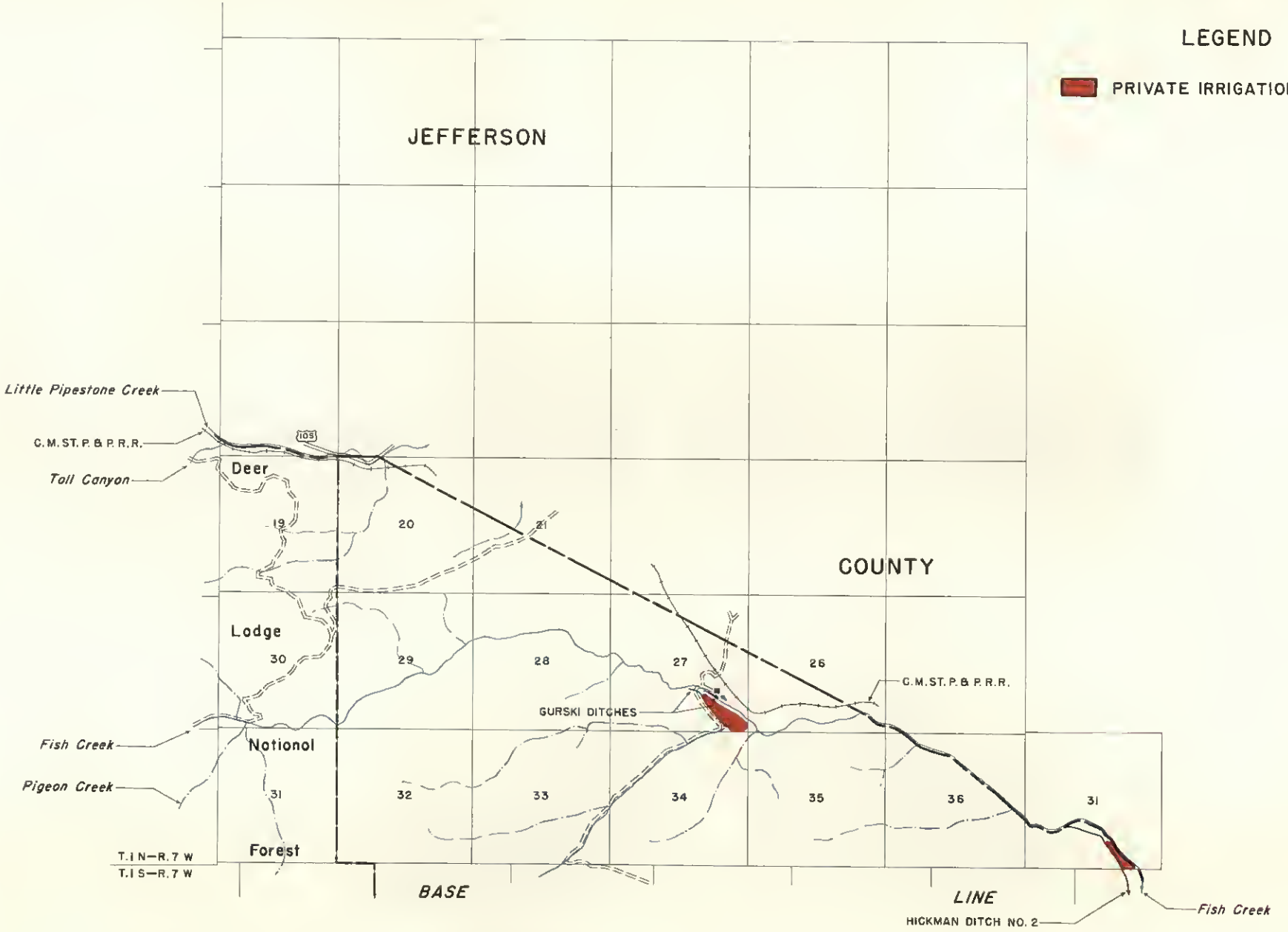
TRANSPORTATION

- PAVED ROADS
- UNPAVED ROADS
- RAILROADS
- STATE HIGHWAY
- U.S. HIGHWAY
- AIRPORT

STRUCTURES & UNITS

- DAM
- DIKE
- FLUME
- SIPHON
- SPILL
- SPRINKLER SYSTEM
- WEIR
- PIPE LINE
- PUMP
- PUMP SITE
- RESERVOIR
- WELL
- NATURAL CARRIER USED AS DITCH
- SPRING
- SWAMP
- GAUGING STATION
- POWER PLANT
- STORAGE TANK
- CEMETERY
- FAIRGROUND
- FARM OR RANCH UNIT
- LOOKOUT STATION
- RANGER STATION
- RAILROAD TUNNEL
- SCHOOL
- SHAFT, MINE, OR DRIFT

Twp. 1 NORTH
Rge. 5 & 6 WEST



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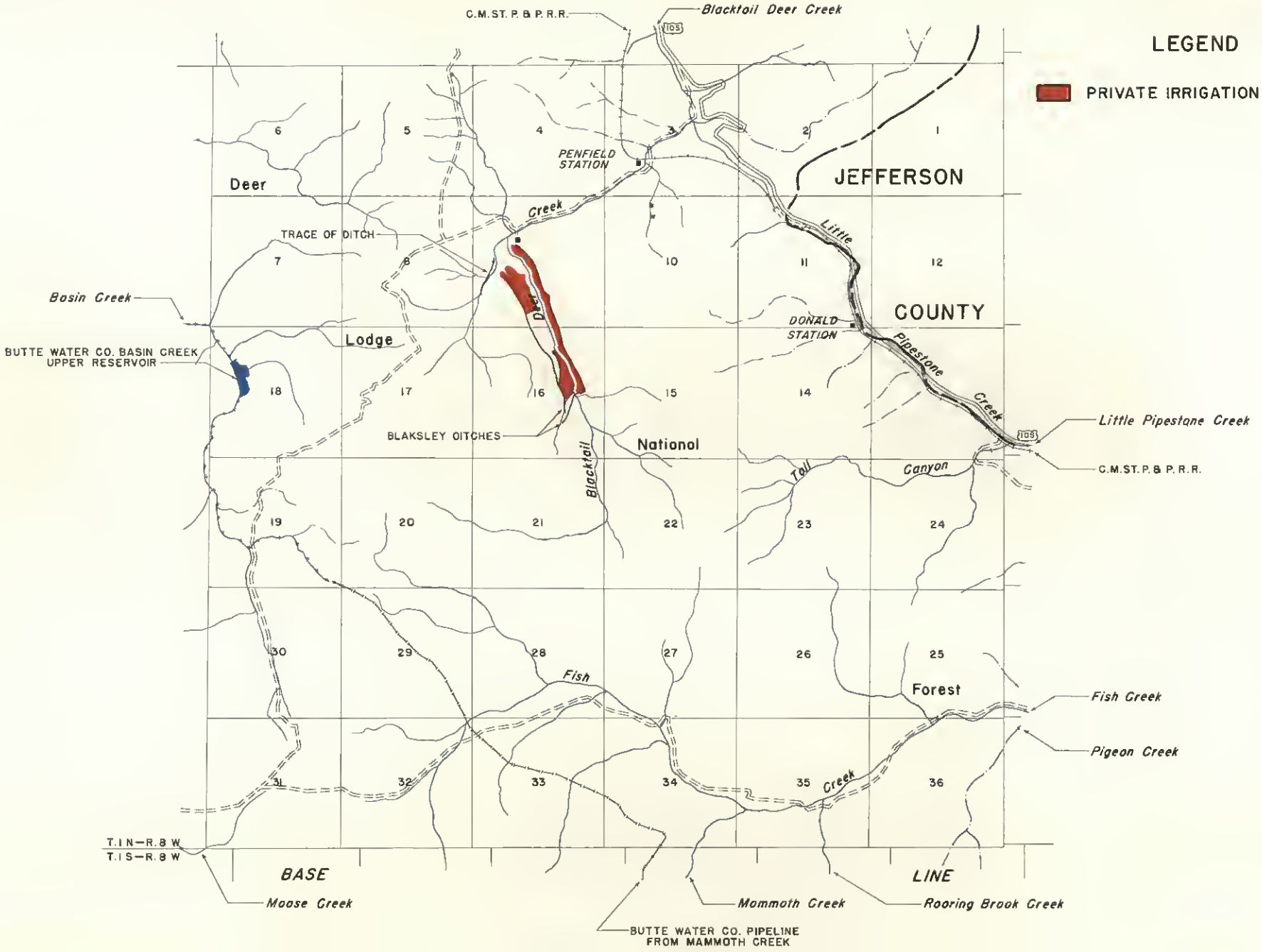
Rge. 7 WEST



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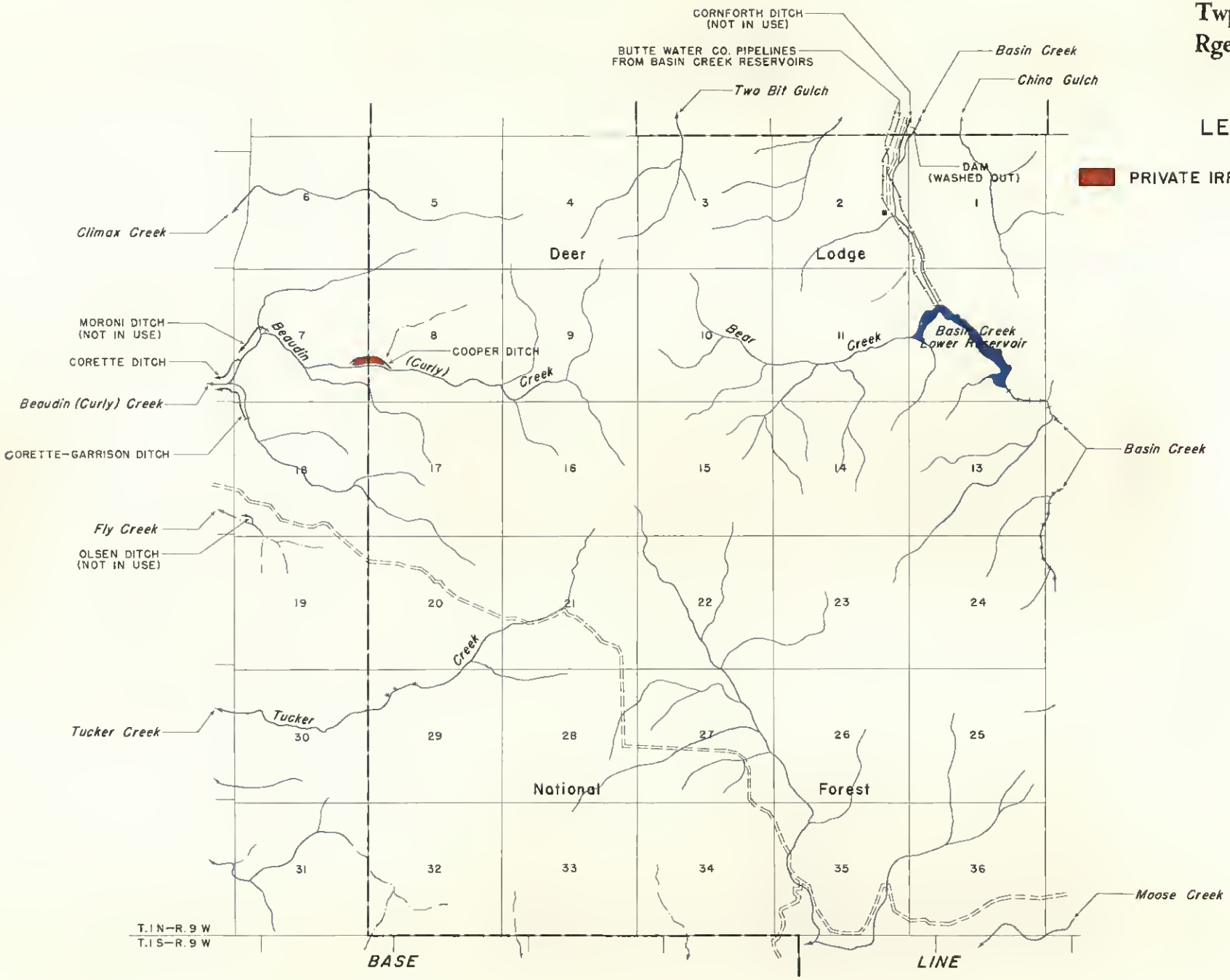
Rge. 8 WEST



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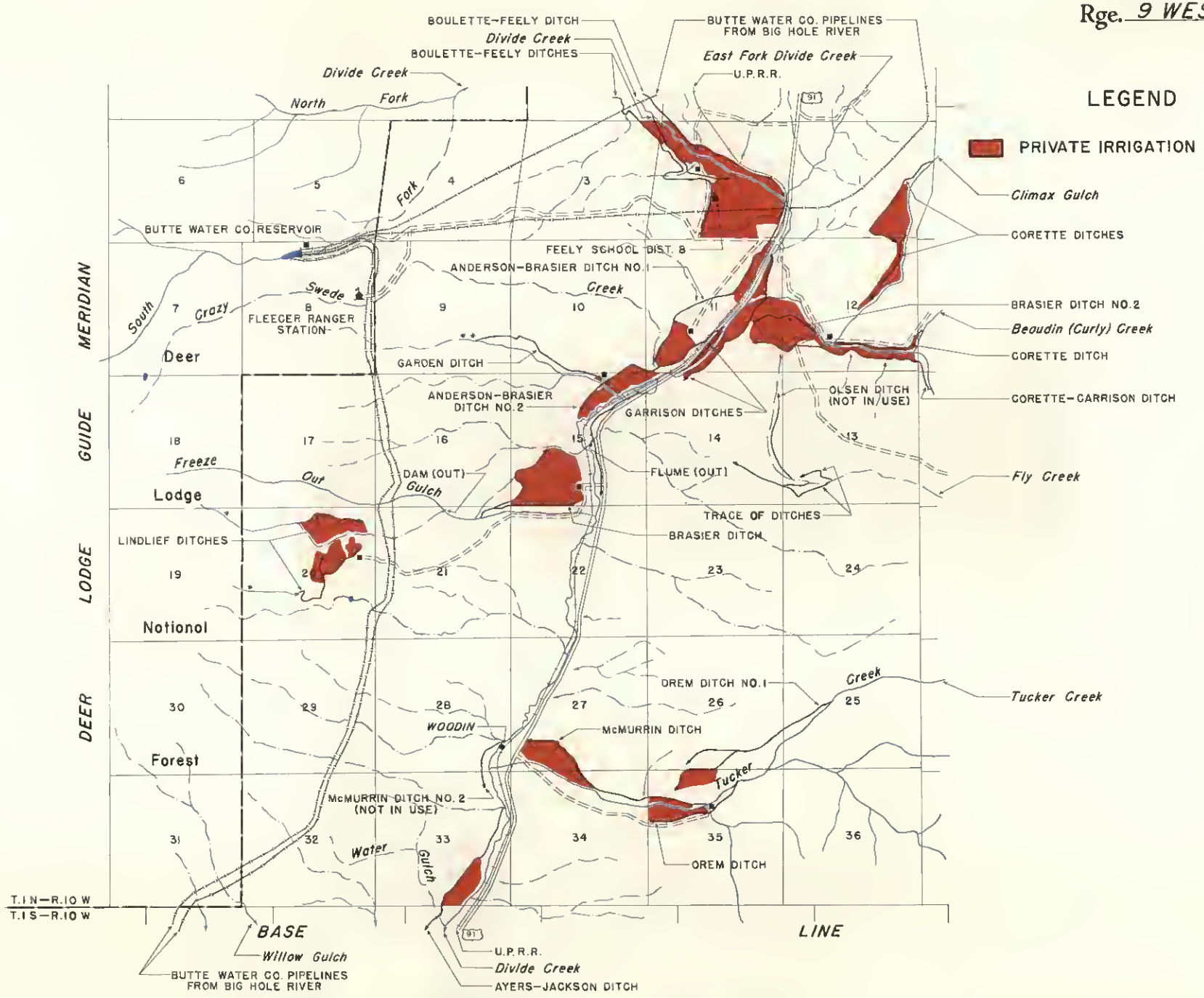
Rge. 9 WEST



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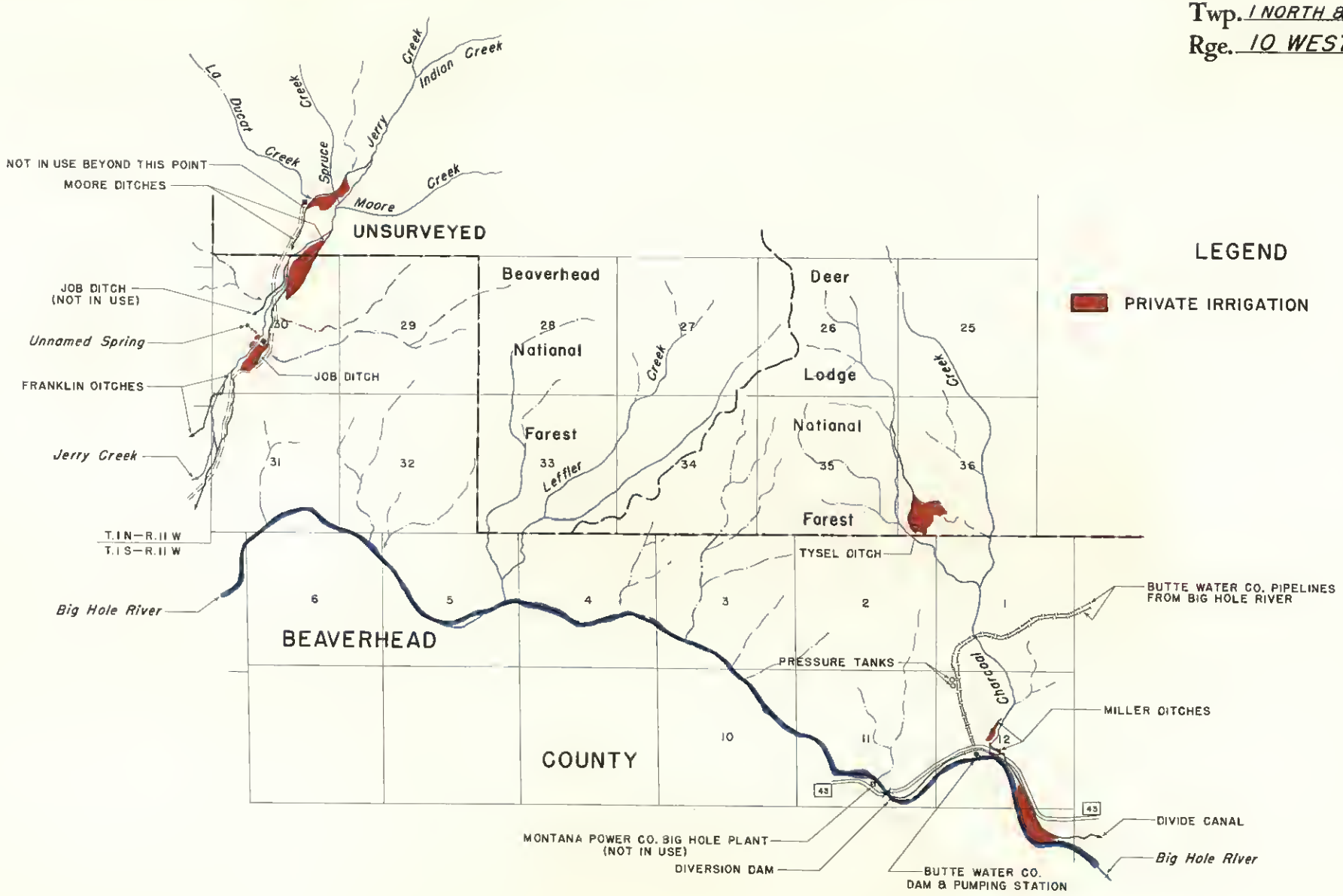
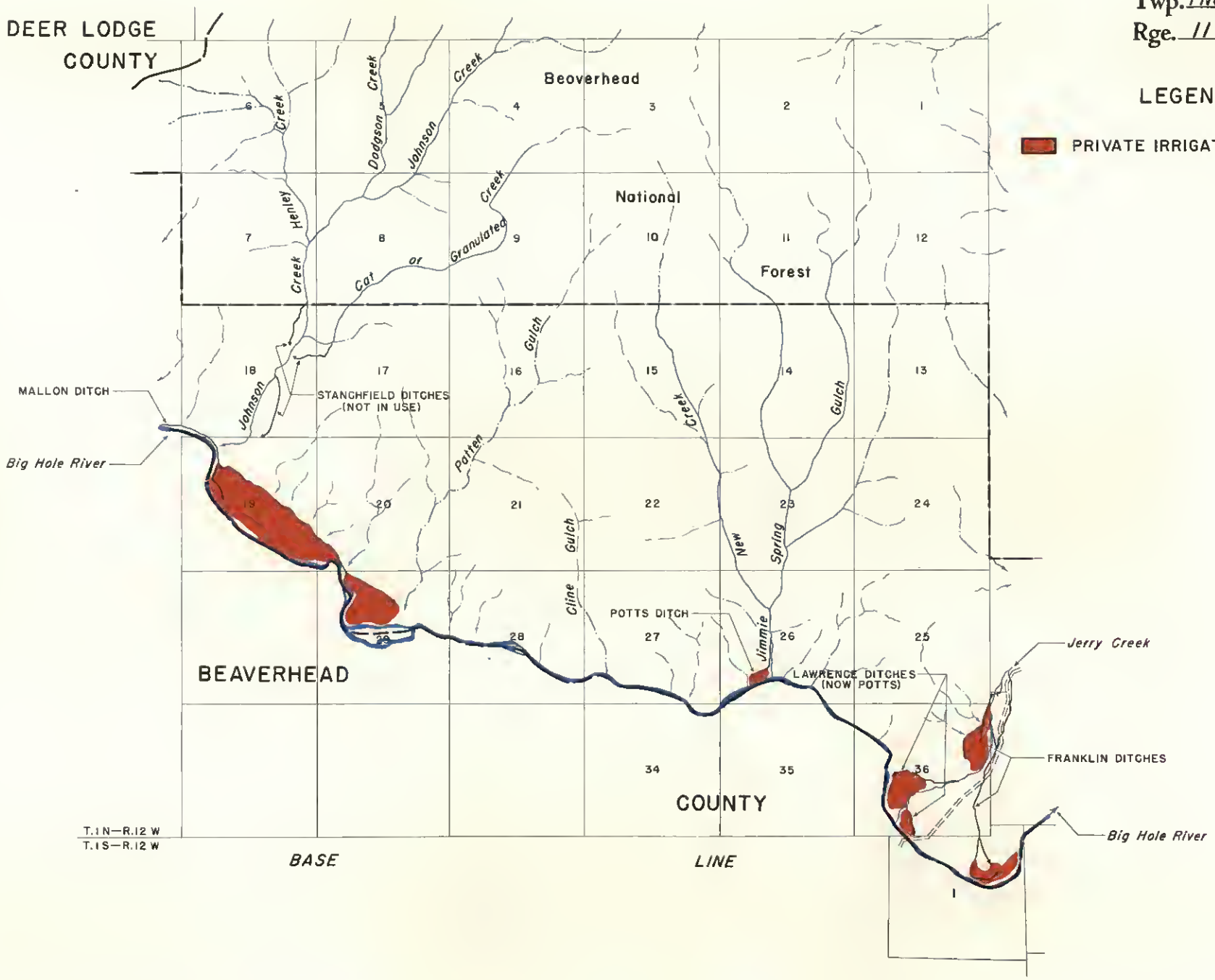
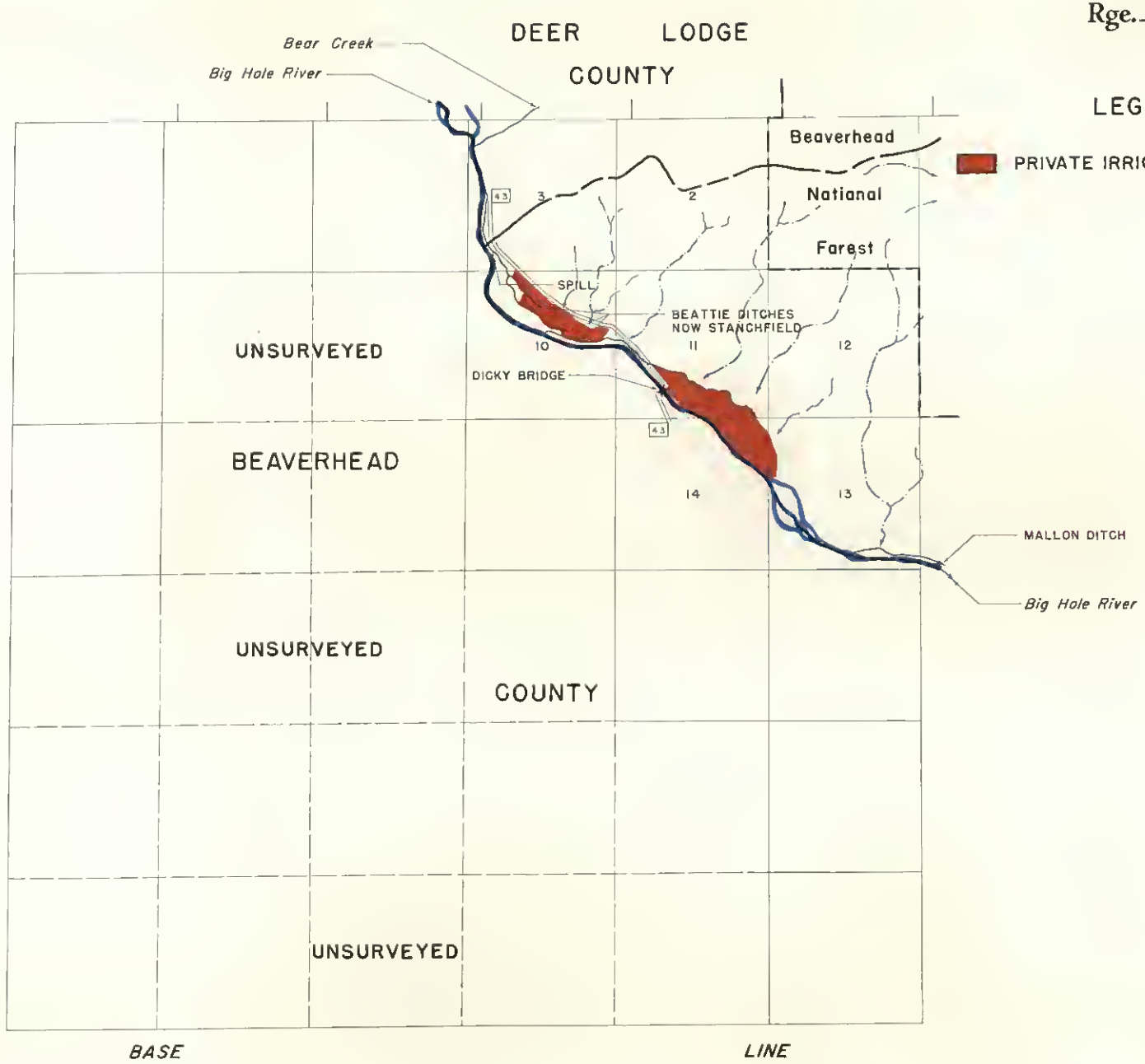
Rge. 10 WEST




Twp. 1 NORTH & 1 SOUTH
Rge. 11 WEST
LEGEND
PRIVATE IRRIGATION
DEER LODGE COUNTY
Beaverhead National Forest
BEAVERHEAD COUNTY
Henley Creek
Cat or Granulated Creek
Dodgson Creek
Johnson Creek
Johnson Gulch
Patten Gulch
Cline Gulch
Creek
New Spring Gulch
Jimmie Creek
Jerry Creek
Big Hole River
MALLON DITCH
STANCHFIELD DITCHES (NOT IN USE)
POTTS DITCH
LAWRENCE DITCHES (NOW POTTS)
FRANKLIN DITCHES
T.1N—R.12 W
T.1S—R.12 W
BASE LINE

Twp. 1 NORTH
Rge. 12 WEST



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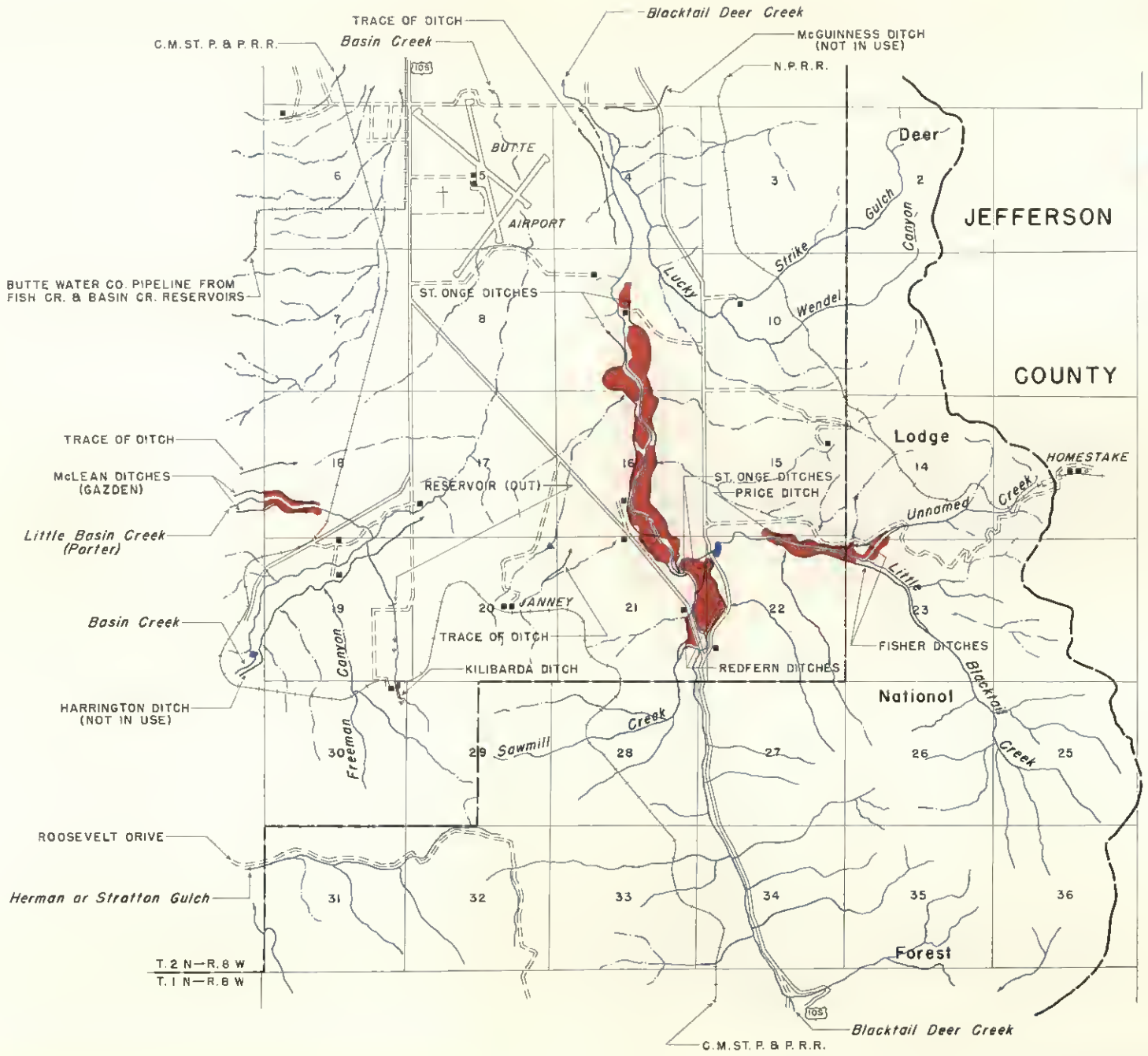
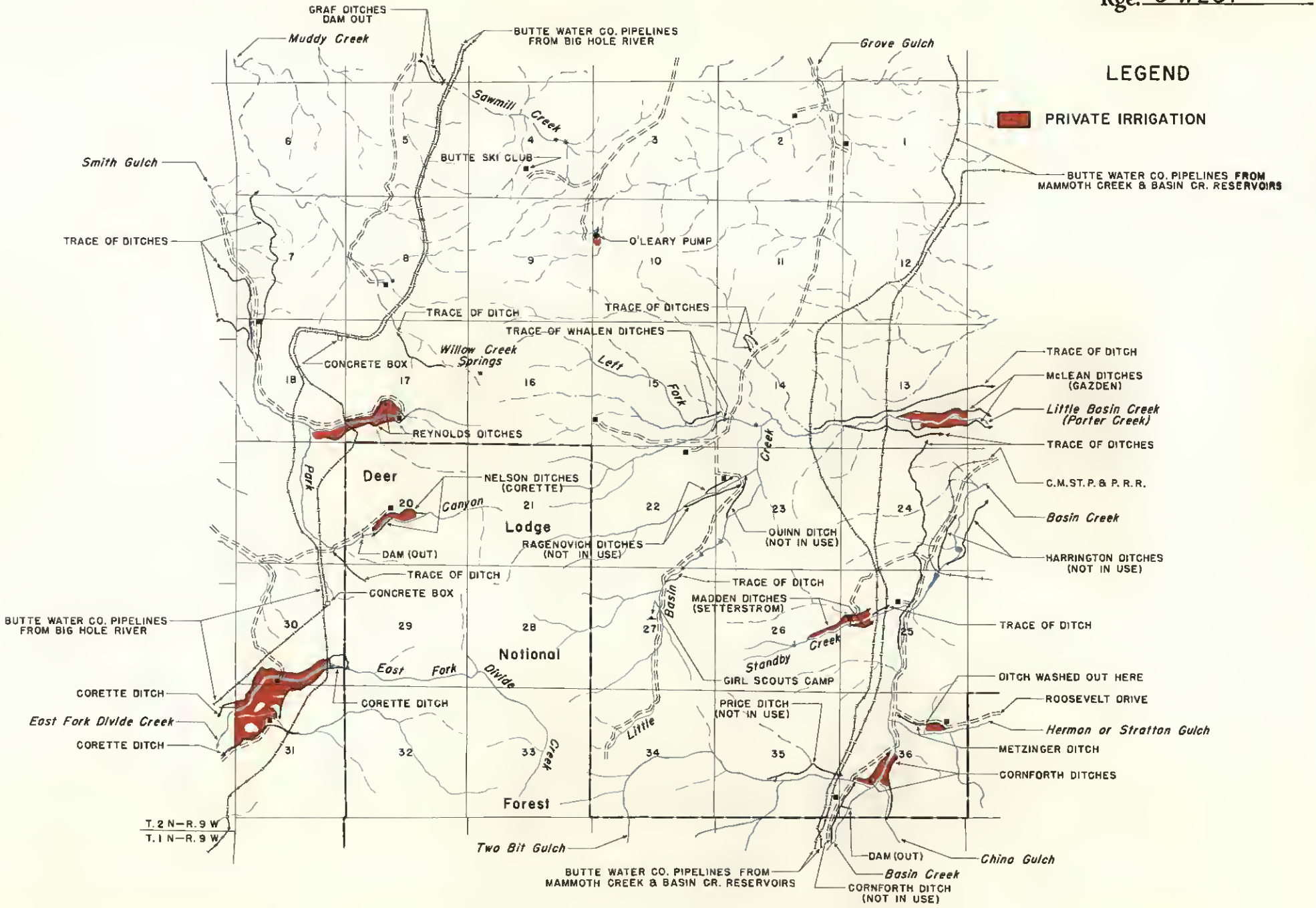
Rge. 7 WEST



LEGEND

PRIVATE IRRIGATION

Twp. 2 NORTH
Rge. 8 WEST



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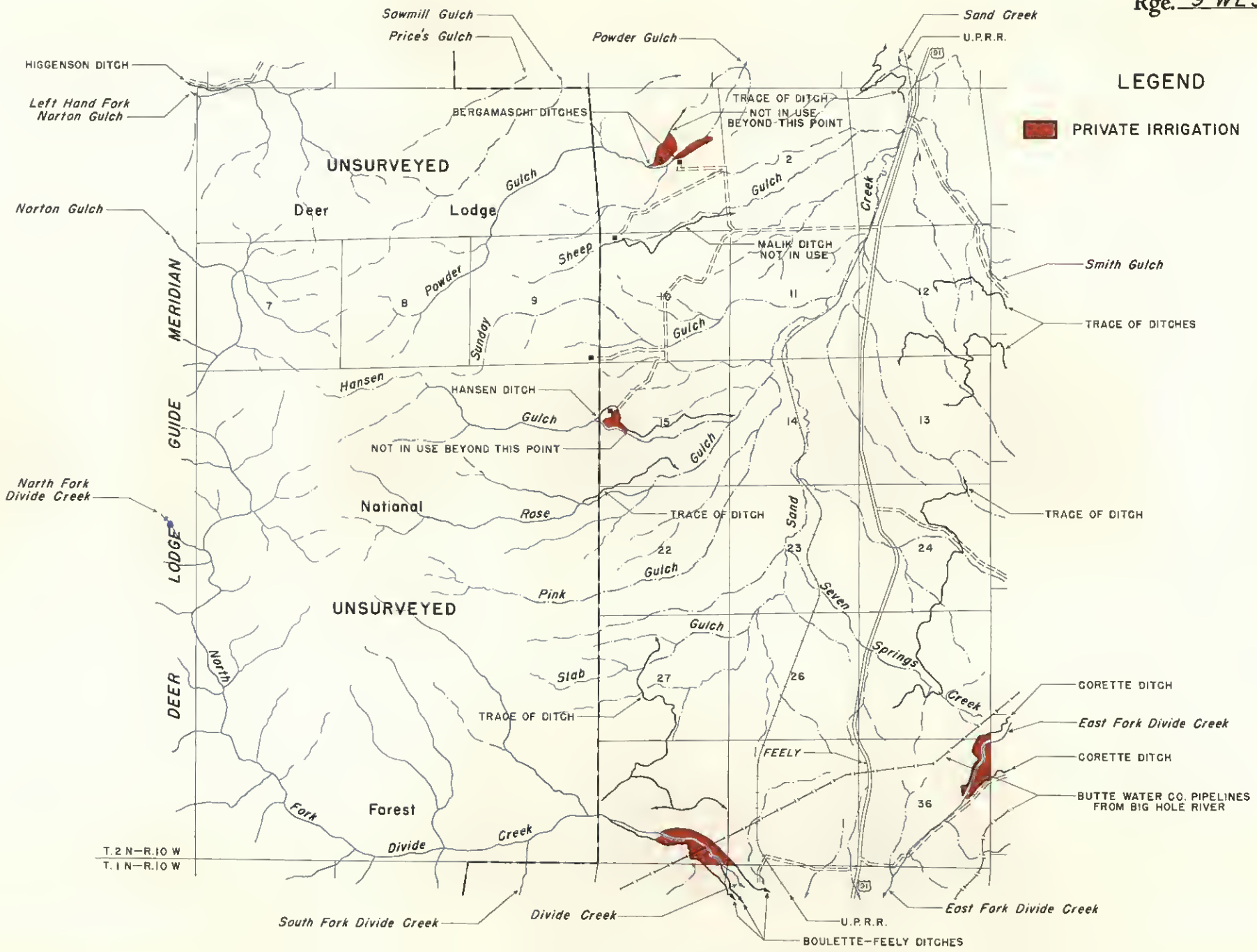

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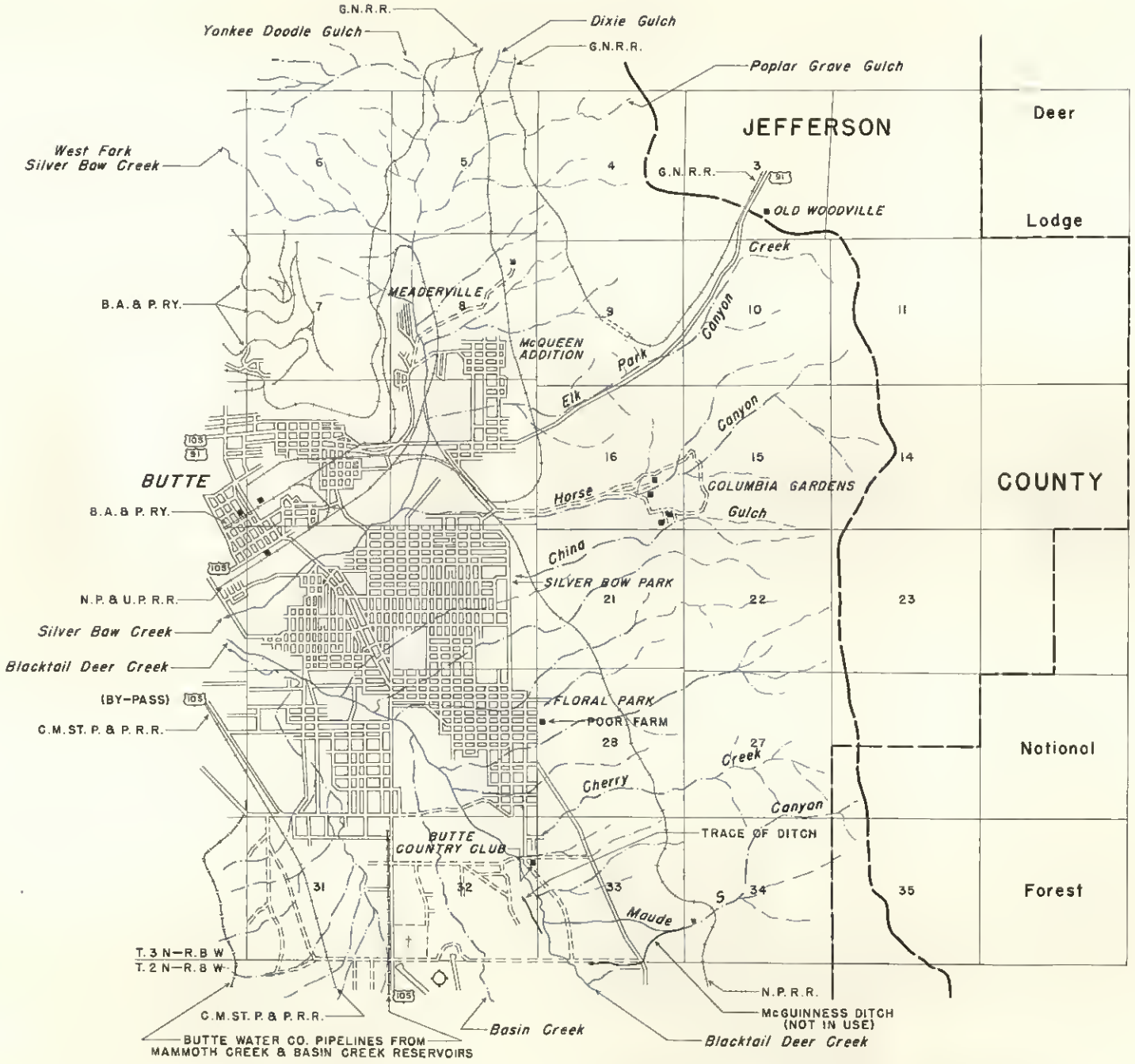

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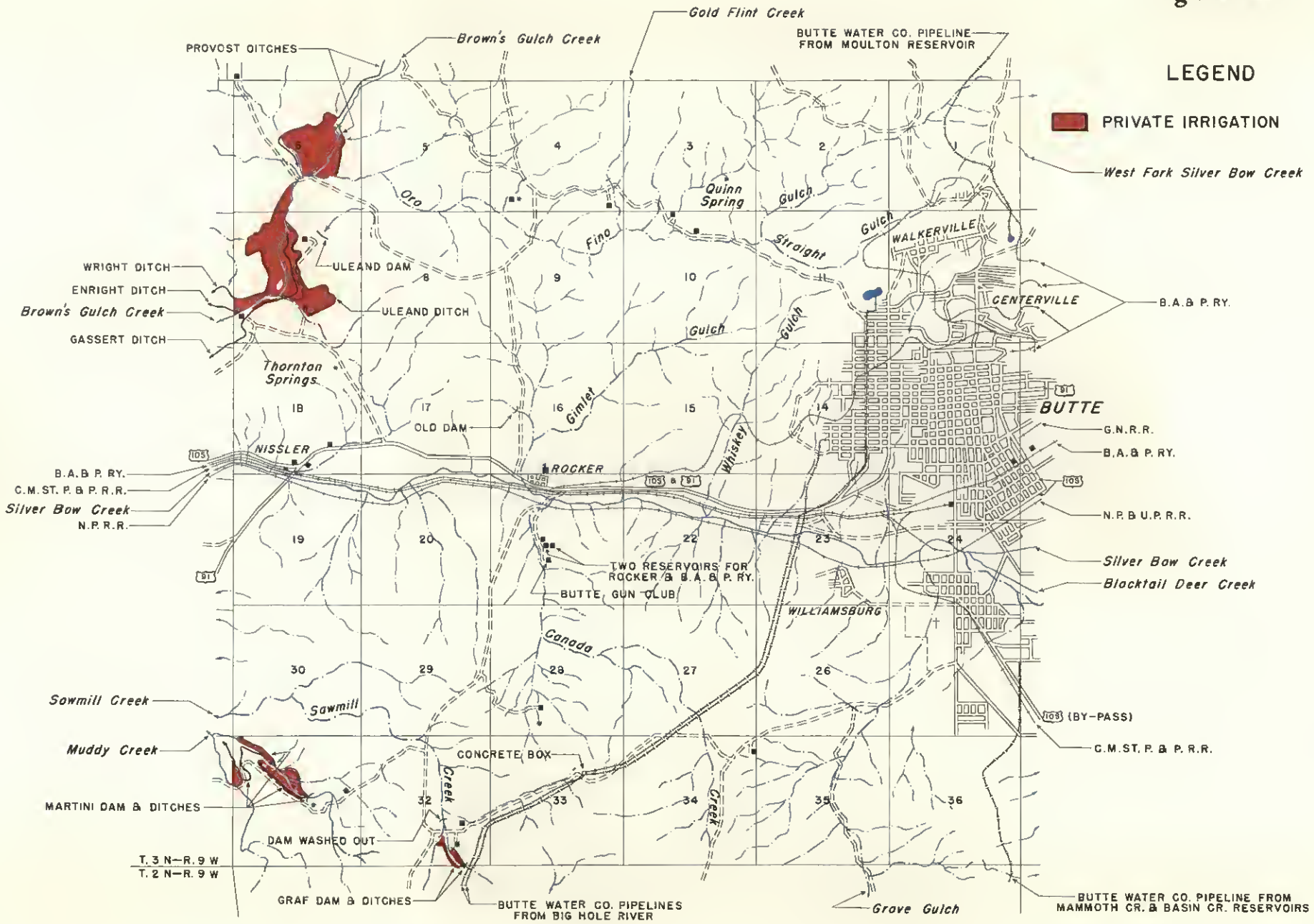
Rge. 8 WEST



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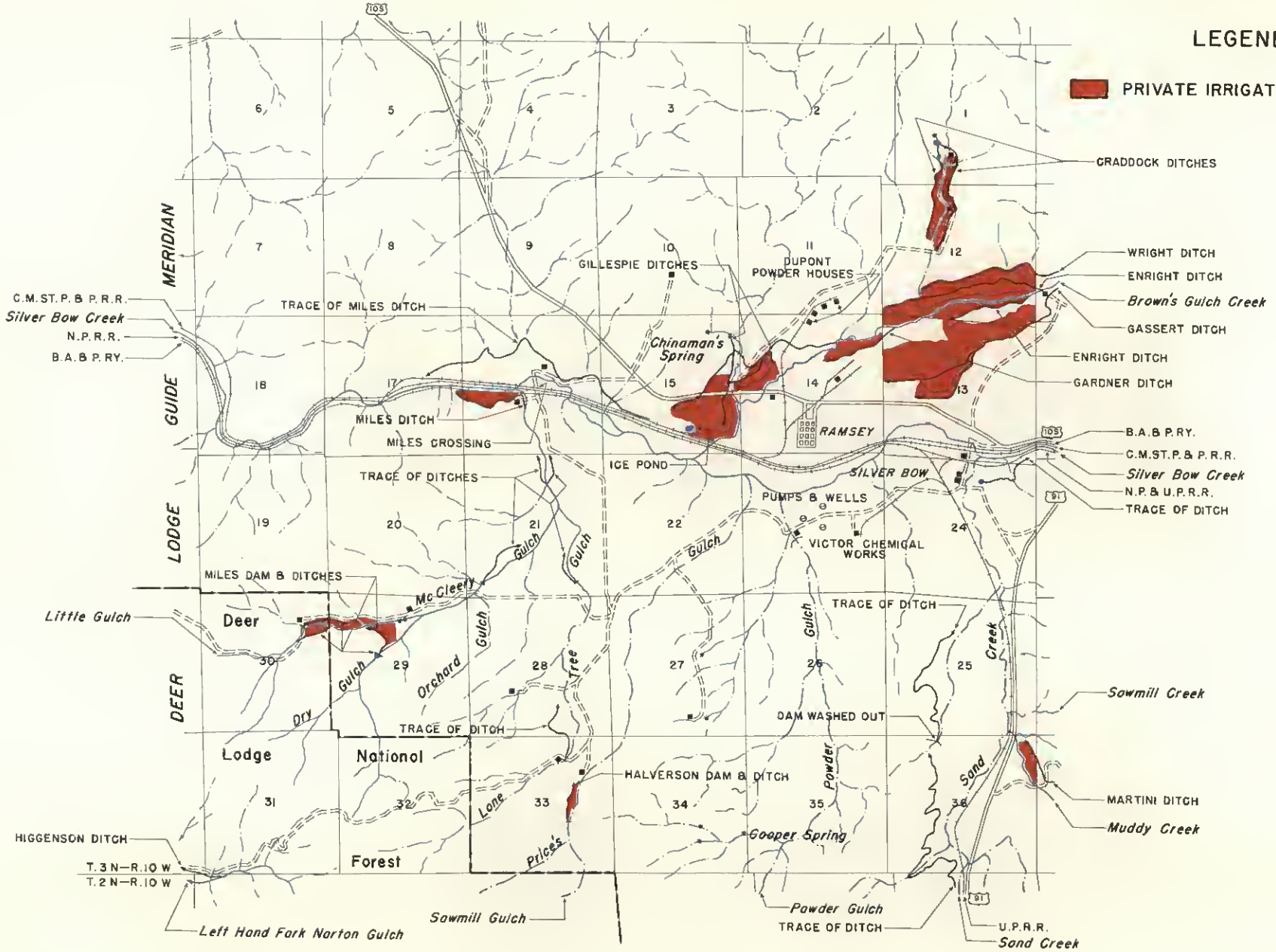
Rge. 9 WEST



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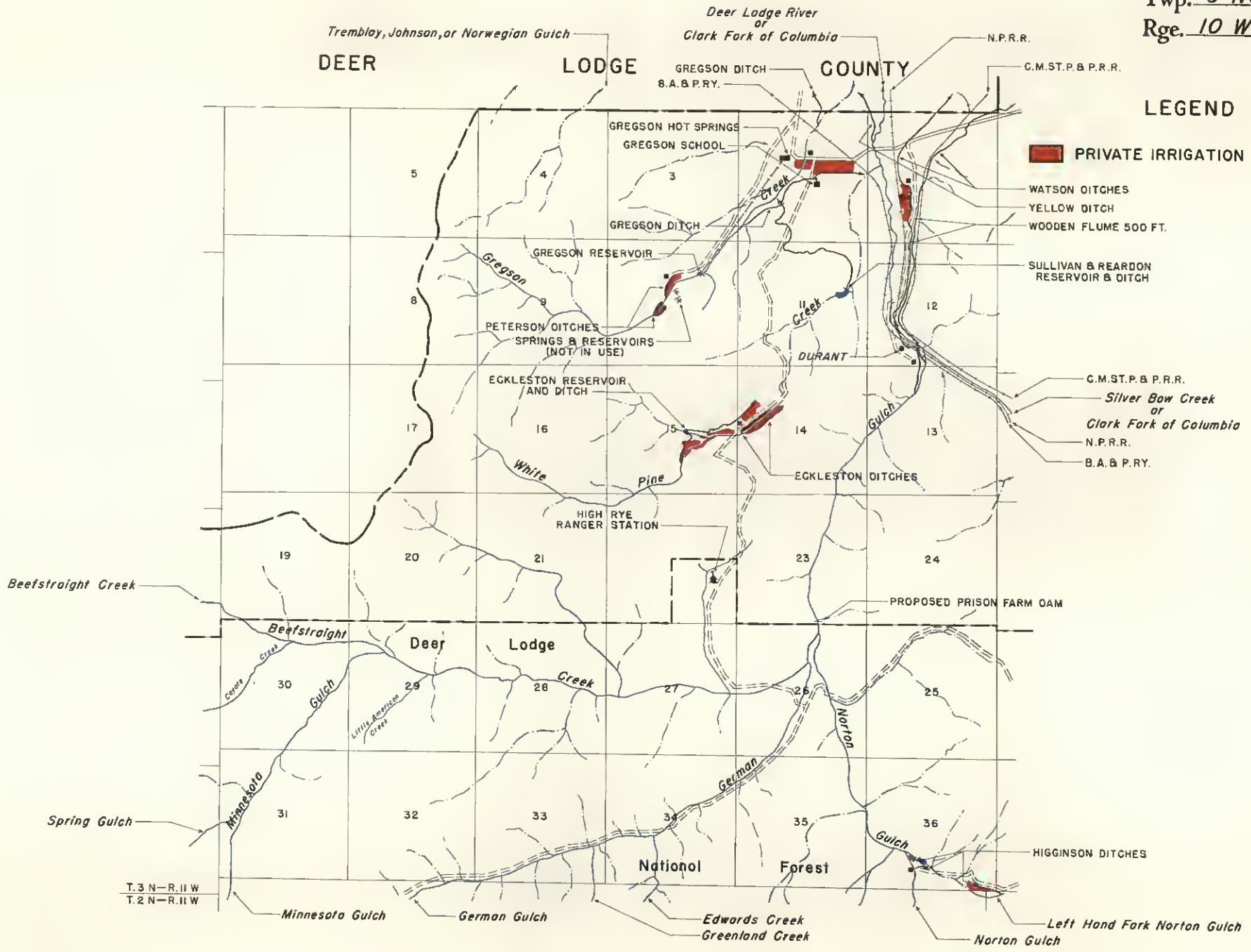

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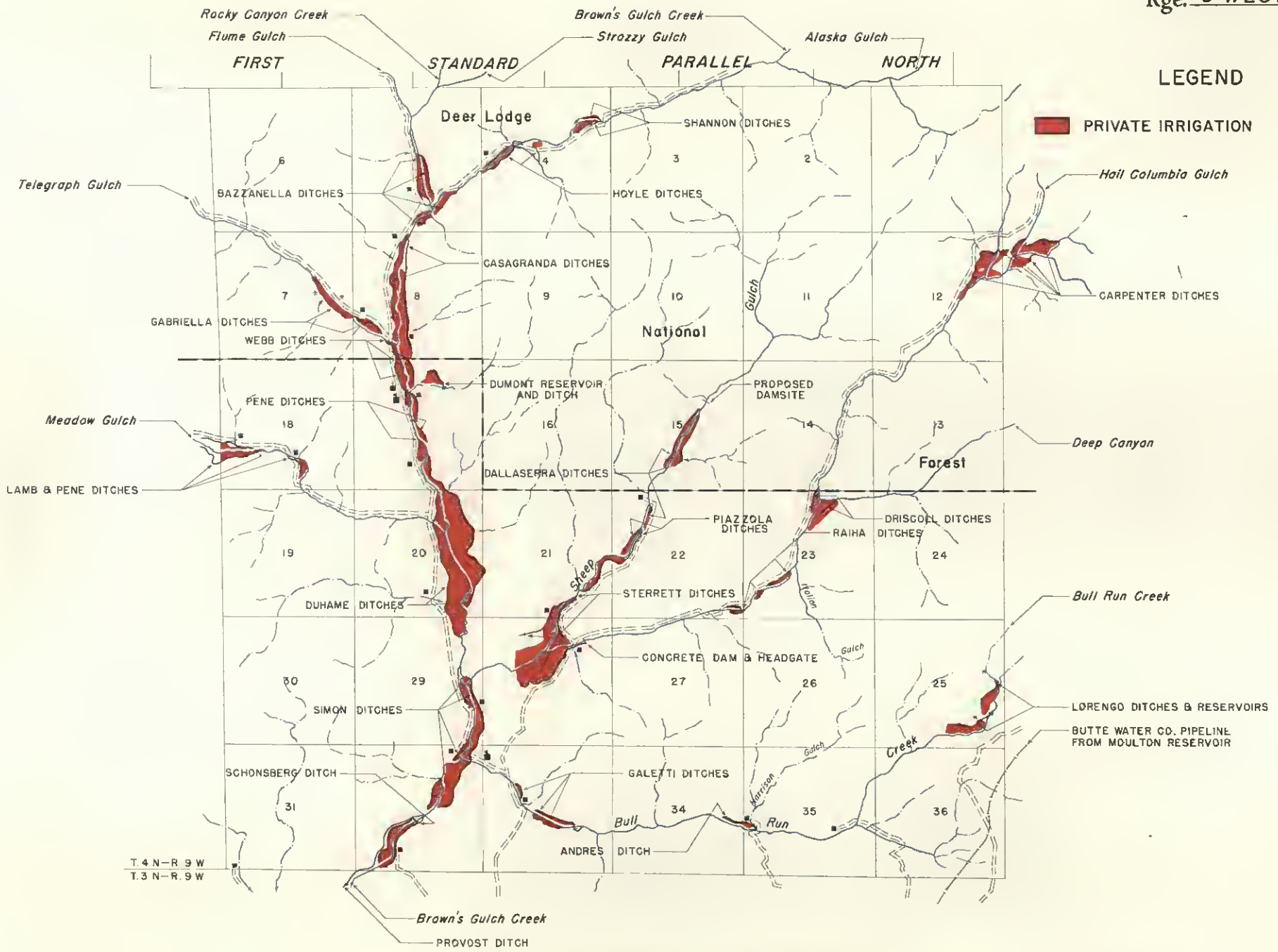

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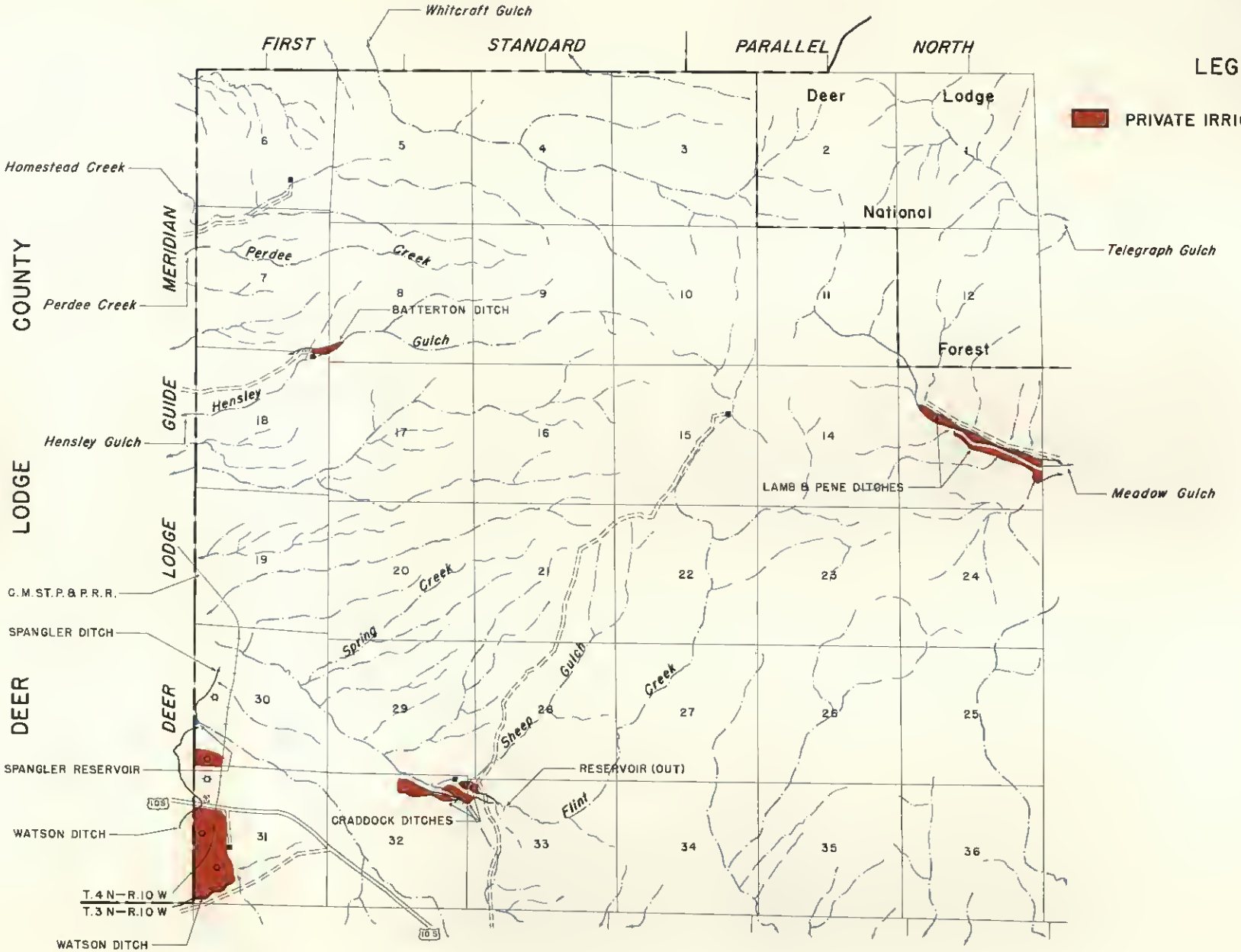
Rge. 9 WEST

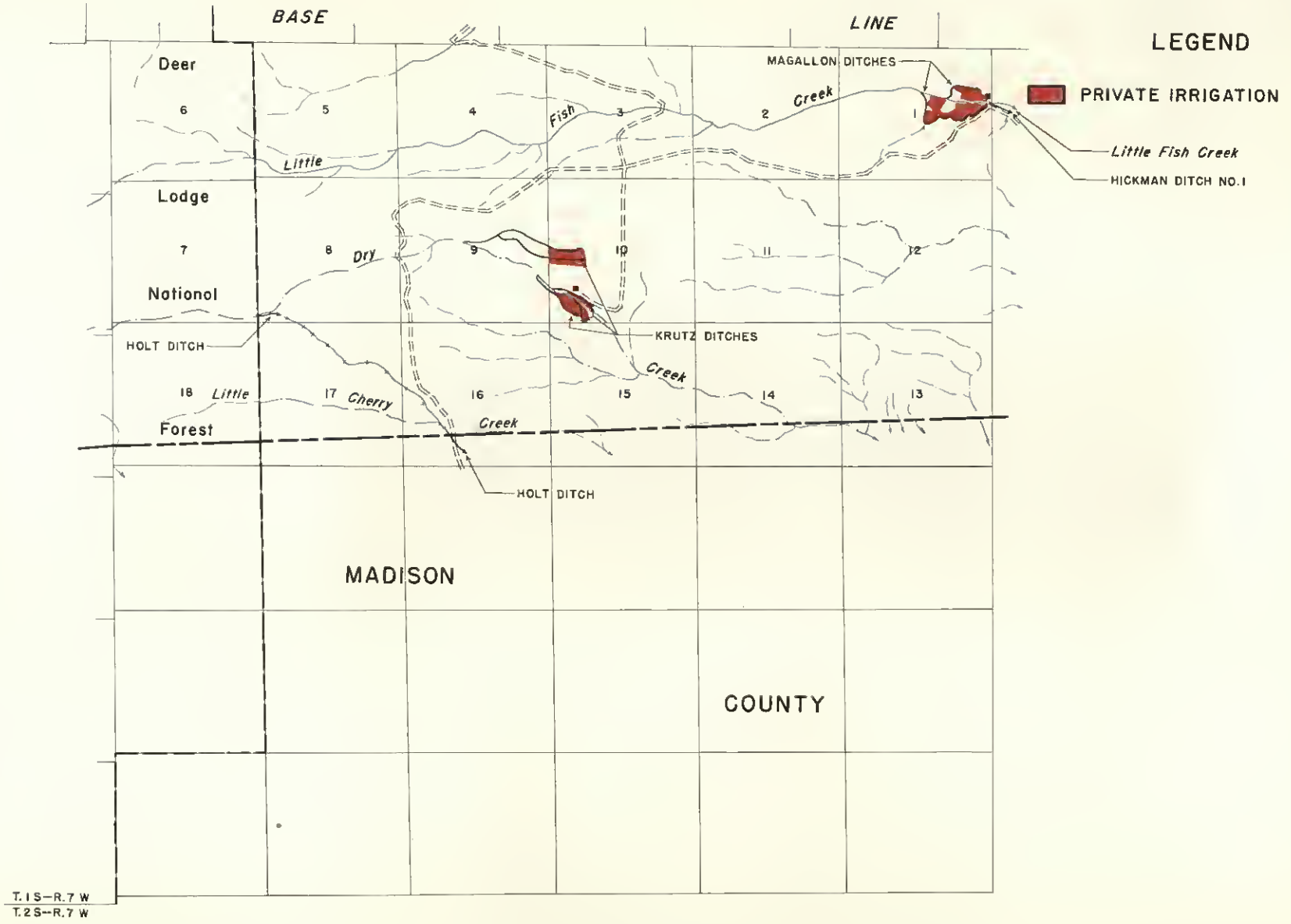


LEGEND

PRIVATE IRRIGATION

Twp. 1 SOUTH
Rge. 5 WEST

Twp. 1 SOUTH
Rge. 6 WEST



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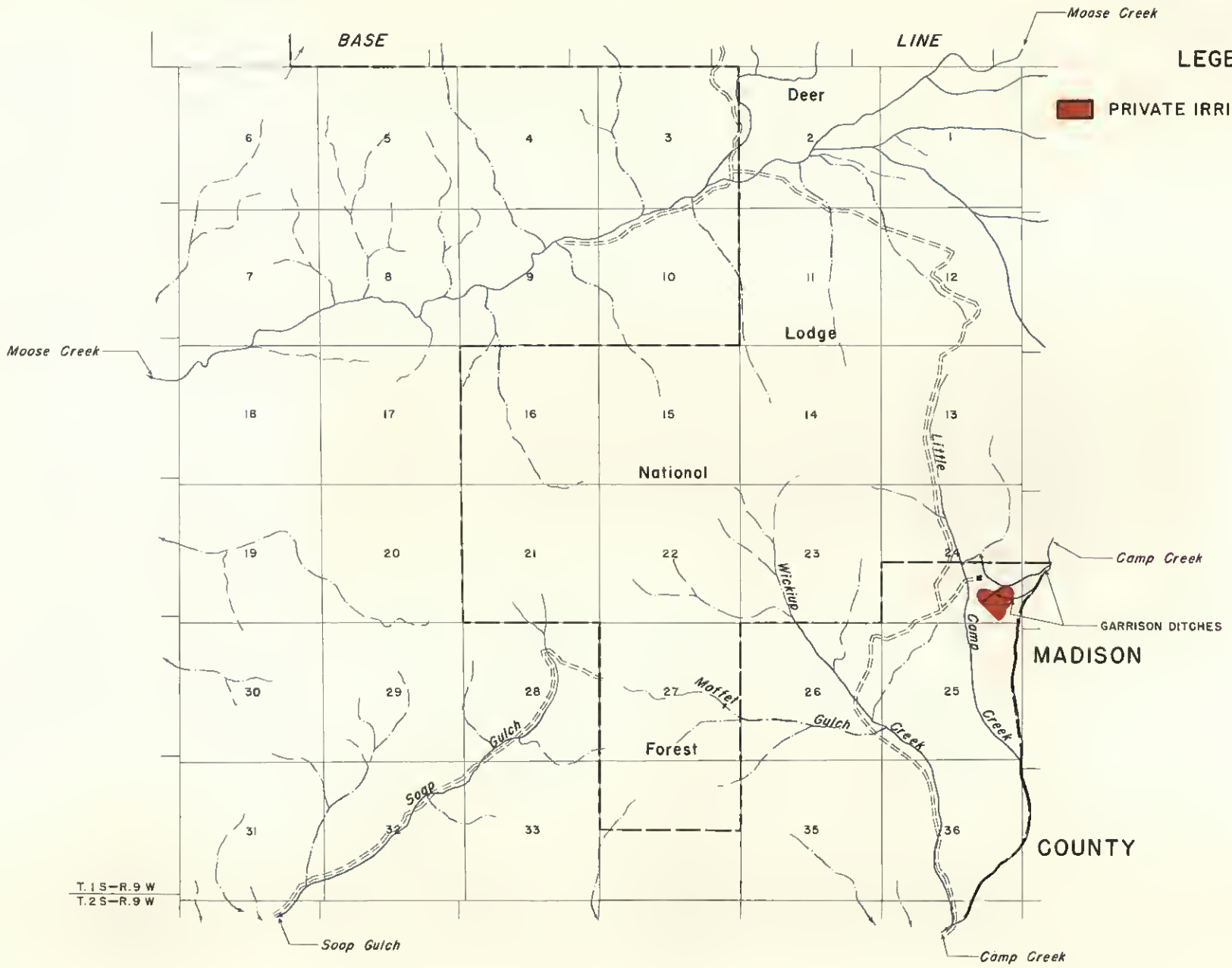

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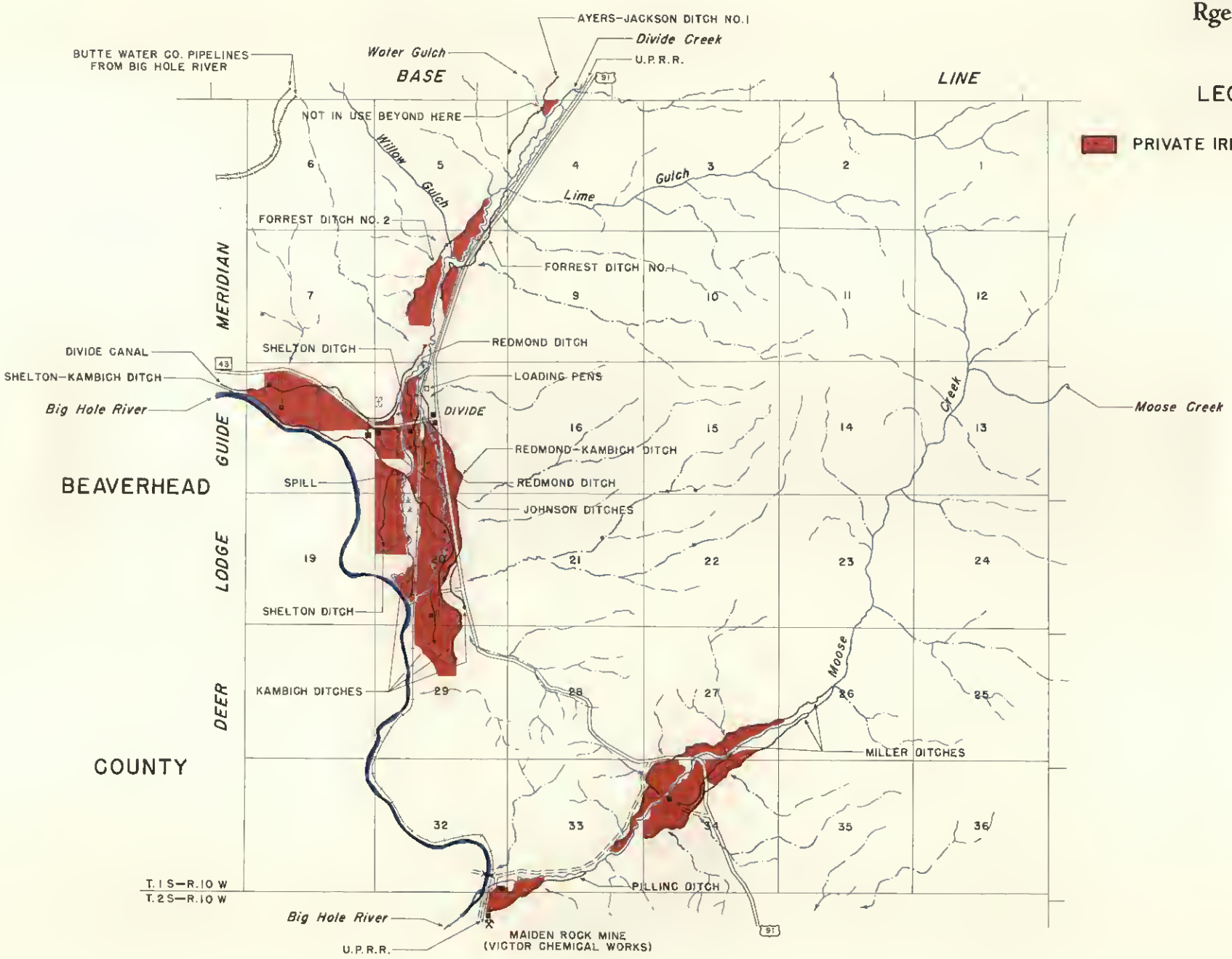

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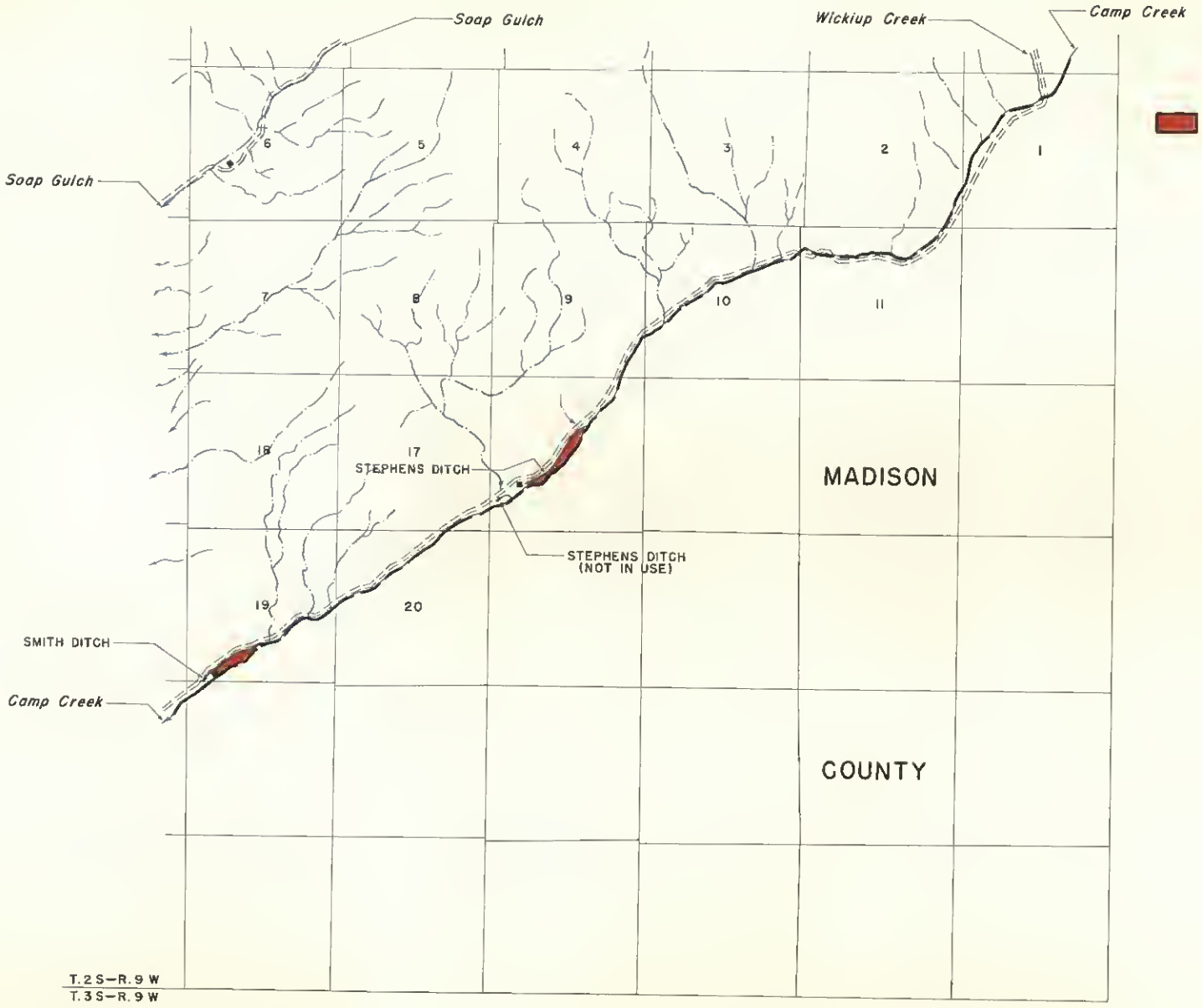

LEGEND

PRIVATE IRRIGATION

Twp. 2 SOUTH
Rge. 9 WEST